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Volume VIII DECEMBER, 1926 Number 12

THE JOURNAL OF INDUSTRIAL HYGIENE

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Published Monthly at Mount Royal and Guilford Aves., Baltimore, Md.
by HARVARD SCHOOL OF PUBLIC HEALTH

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Journal of Industrial Hygiene

55 Van Dyke Street

Boston, Mass.

THE JOURNAL OF INDUSTRIAL HYGIENE

PUBLISHED MONTHLY

VOLUME VIII DECEMBER, 1926 NUMBER 12

MINERS' NYSTAGMUS: ITS SYMPTOMS, CAUSES, AND EFFECT ON WORKING CAPACITY*

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Professor Ohm, who is one of the leading authorities on miners' nystagmus in Europe, has spent many years in devising and perfecting most delicate apparatus for the permanent recording of the ocular movements found in nystagmus and similar conditions. In nystagmography he has evolved a new method of physical examination.

In the paper here presented, which has been translated by his brother (Rector Charles Ohm, Senden, Westphalia) Professor Ohm gives the result of many years of work, much of which has been carried out in the quiet of his study. Professor Ohm uses the word "symptoms" in the sense of "physical signs."—*Ed.*

INTRODUCTION

MINERS' nystagmus is a sphere of research in which the scholars of different nationalities ought to help one another; first, because the working conditions in the different countries are very diverse and an exact comparison will, therefore, help to elucidate the cause and the prophylaxis of this disease; and secondly, because the problem is so complicated that only few scholars, especially if they are general practitioners, are able to find out all the facts about the subject.

Miners' nystagmus is, first, an economic problem, the importance of which is demonstrated by the fact that in Europe far more than 100,000 miners suffer from it for a long time in the best years of their lives and become prematurely unfit for work. As a result, the industry loses good workmen and has to pay high annuities. The yearly loss arising from this disease is estimated by Llewellyn at more than £1,000,000 for England.

For the physiologist, however, miners' nystagmus is far more—namely, an inestimable source for study of the theory of the brain func-

*Received for publication April 22, 1926.

tion, of which we know very little for certain. It presents a very valuable living manifestation of important parts of the nervous system which we can observe exactly with relatively simple means and can influence in various ways. The profit with which the theory of the motor innervation of the eyes can be studied in this disease has hitherto been known only to few.

Since the first description given by the Belgian military surgeon Decondé (1861), the disease has been much discussed by oculists in the coal districts of Europe. Among those who took part in the earlier discussion I may mention Schröter, Nieden, Reuss, Alfred Graefe, Wilbrand, and Peters (Germany); Snell, Oglesby, Bell, Thompson, Court, Reid, Butler, and Tomlin (England); Dransart and Pechdo (France); Romiée, Nuel, Stassen, Benoit, Rutten, and Coppez (Belgium). In recent years discussion has been especially zealous in England, where the disease has become so important a social and economic problem, owing to its great increase, that there has been appointed to investigate it a committee composed of J. S. Haldane (chairman), E. L. Collis, G. H. Pooley, W. H. R. Rivers, and T. L. Llewellyn (secretary). The last named has done good work in investigating the disease; since 1910 he has studied the causes of the disease in different parts of Great Britain with untiring zeal. Stassen (Liége) also has obtained a knowledge of the miners' working conditions through an intimate intercourse of many years. Mention should also be made of McMurray, Elworthy, Anderson, Cridland, Percival, Evans, Coulter, Eddison, and Fergus.

Lately a short report of five cases has been published by Marshall of the United States and another report of twenty cases by Balabonina of Russia. (The first American publication devoted to the subject is by Hoffman. It reports only European literature.)

The discussion in England has been engaged in recent years with the causes and prophylaxis of the disease and the working ability of the patients. Investigation of the disease as such with regard to its details has been neglected. Since 1908 I have made the close study of its symptoms my task and, as these inquiries are very little known in the Anglo-Saxon countries, I should like to give a short sketch of my results and then to draw from it certain conclusions with regard to causation of the disease and its effect on the working ability of the patient. My experience refers to more than 1,400 cases, many of which have been investigated carefully in the quiet of my laboratory by means of methods devised by myself, among which nystagmography[1] plays the chief part. In view of the numerous forms or aspects of the disease, my description here can only be short. Readers wishing more details are referred to my three monographs (1912, 1916, and especially 1925) and to numerous single papers published in von Graefe's *Archiv für Ophthalmologie* (1915 to 1926).

Symptoms

The question as to which symptoms associated with the disease are caused by occupation is answered differently by different observers. I define the

[1]Apparatus is made by von der Winkel, Bottrop, Osterfelderstr. 4.

disease as a particular disturbance of motility which is characterized by nystagmus, eyelid spasm, and tremors in other parts of the body. Generally a progression can be traced in the sense that first nystagmus appears, then eyelid spasm, and lastly tremor.

1. *Nystagmus*

Movement, development, amplitude, and frequency are to be distinguished. All the signs are so different that among 100 cases no two are to be found which agree exactly.

Movement.—Movement can be perpendicular, horizontal, diagonal, rotatory, circular, or elliptical, moving with or against the hands of a clock, and has numerous combinations; both eyes may swing either in the same direction or in different directions. The latter is more frequent. Among 155 cases I have observed sixty-five different combinations.

Development.—Other authors have described miners' nystagmus as pendulum-like. I have found after many years' study by means of nystagmography that, besides the pendulum-like oscillation observed in the majority of the cases (Figs. 1 and 2), jerky oscillation (*ruckförmiges Zittern*) (Fig. 3) and other forms may be present. It may be said that the larger the amplitude of movement is, the more frequent are the deviations from the perpendicular character.

Amplitude.—Amplitude lies mostly about 1/2 mm. and rarely goes beyond 3 mm. By means of nystagmography I have detected movements of the eye down to 1/50 mm. Converted to angle degrees, the amplitude lies therefore between 7 minutes and 17 degrees.

Frequency.—In 155 of my recorded cases frequency lay between 46 and 410 movements a minute; sometimes still higher frequencies are observed up to 840 movements. Only a few cases have the same frequency. If the minute-frequency of the nystagmus is opposed to the second-frequency of the tones, one gets a scale of nystagmus which shows eighty-one grades among the 155 cases—consequently more than the tempered chromatic scale, which shows only thirty-eight grades from f-2 to g1. The lowest frequencies are found only in jerky oscillations; the highest in pendulum-like ones.

While movement and amplitude are for the most part different for the two eyes, development and frequency always agree exactly for both eyes.

These are the primary symptoms of miners' nystagmus. Diagnosis of the individual case depends largely on fixing the conditions under which the nystagmus appears. Here the greatest personal differences are found; therefore many consider nystagmus as a very inconstant disease. But it is generally not so to the student who is acquainted with all its symptoms and who knows how to judge the stage of development of the disease. The following factors are to be considered.

Position of the Eyes.—Place the patient in an upright attitude, chin and forehead resting against a support, at a distance of 1 meter from an evenly lighted tangent screen and let him look at a mark just in front of him in zero point. If no nystagmus is noticed, move the mark slowly higher to the point at which the tremor begins and indicate this with chalk. Then move the mark 5 degrees higher so that the nystagmus will reach its

full height; then lower the mark till nystagmus ceases, and indicate this point with chalk also. In the same way move the mark 10 degrees at a time to the right and to the left, in order to get the tremor field (Fig. 4). The unbroken line signifies the visual direction at which tremor begins. What is above it, I call the absolute tremor field. The dotted line represents the position of the eyes at which tremor ceases. What lies between the dotted line and the unbroken line, I term the relative tremor field. The tremor field is one of the necessary bases for determining the severity of the nystagmus. It is very different in each case. In one case it lies in the upper portion of the field of vision (*Blickfeld*), in another it extends over the whole field of vision. Between these extremes every nuance is possible.

Illumination.—There are cases which show nystagmus by daylight and others which are affected only by lamplight or in full darkness. The tremor field is always larger in the dark than in the light. Nystagmography shows that the oscillations of the eyes are smaller, more regular, and often more frequent in the light. The frequency difference between the oscillations in the light and those in the dark may be only a few strokes or many (eighty or more strokes) a minute. It must be pointed out especially that light has a soothing effect on nystagmus not only from the region of the fovea, but also from the outermost periphery of the retina.

The results shown in Figure 5 were obtained under the following experimental conditions. The patient looks straight ahead at a small mark. A 100-candle power incandescent lamp stands 50 degrees horizontally to the left, so arranged that its light cannot shine directly on the point fixedly looked at by the patient. If the incandescent lamp is turned on, no nystagmus exists. If it is turned off, and a very small incandescent lamp is allowed to spread a weak glimmer at the side of the patient, sufficient to make the fixation of the mark possible, instantly a vivacious pendulum nystagmus of a frequency of 5.4 a second appears. When the large incandescent lamp is turned on again at the thirtieth second, the nystagmus becomes less at once, and then decreases gradually to the thirty-third second. From the thirtieth to the thirty-second seconds, the frequency increases to 6.25 a second. The frequency has thus risen considerably as the darkness is lessened. The large incandescent lamp is put out again in the thirty-sixth second, whereupon nystagmus begins again in the thirty-ninth second. The effect of the light is the more efficacious the nearer the irritated place lies to the fovea. Not only white light but also colored light is of influence.

State of Refraction.—Sometimes it is possible to produce nystagmus, when strong plus glasses are set before the eyes, and to arrest it, when an existing myopia is compensated.

Binocular Vision.—Sometimes suppression of the binocular vision is sufficient to produce the onset of nystagmus.

Convergence.—Nystagmus is most readily obtained by looking at an object in the distance; it diminishes a little when the object fixed approaches to within 80 to 60 cm. When the object is at a distance of 30 to 20 cm.,

the amplitude of the nystagmus generally becomes a great deal smaller, and the frequency increases. If the object is placed at about 10 cm. from the patient, the most severe nystagmus generally ceases temporarily. In an existing nystagmus if prisms are set before the eyes, especially if they have an adductive effect.

The Optical Turning Wheel.—This has no effect in many cases of severe nystagmus. In other cases a combina-

FIG. 1.—Showing pendulum-like oscillation; 306 oscillations in one minute.

FIG. 2.—Showing pendulum-like oscillation; 231 oscillations in one minute.

FIG. 3.—Showing jerky oscillation; 138 oscillations in one minute.

Figure 6 first an object at a distance of 75 cm. is fixed. In the twenty-third second the look goes over to an object 30 cm. distant, whereupon the nystagmus disappears immediately. By looking at an object in the distance the nystagmus begins again in the twenty-fifth second with small oscillations which soon become larger. This experiment can be repeated at pleasure with the same result.

Fusion.—With the object at the same distance one can sometimes observe a diminution or a suspension of

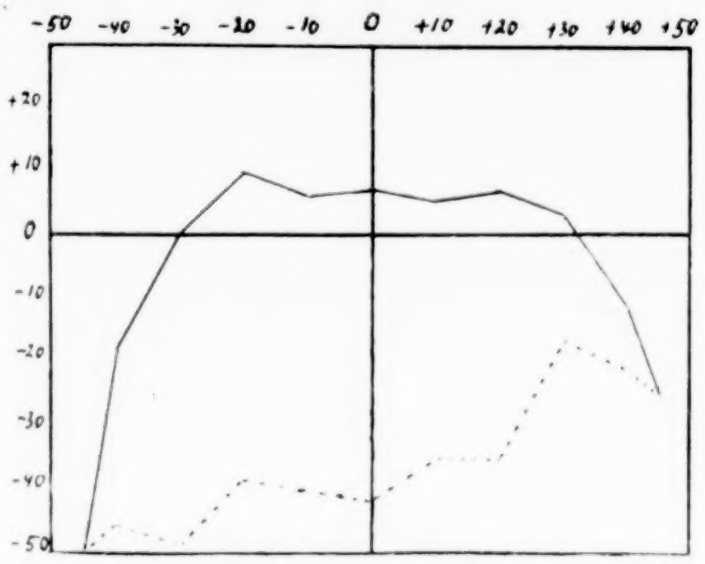

FIG. 4.—Showing tremor field. Position of the eyes at which tremor begins is indicated by unbroken line; that at which tremor ceases, by dotted line.

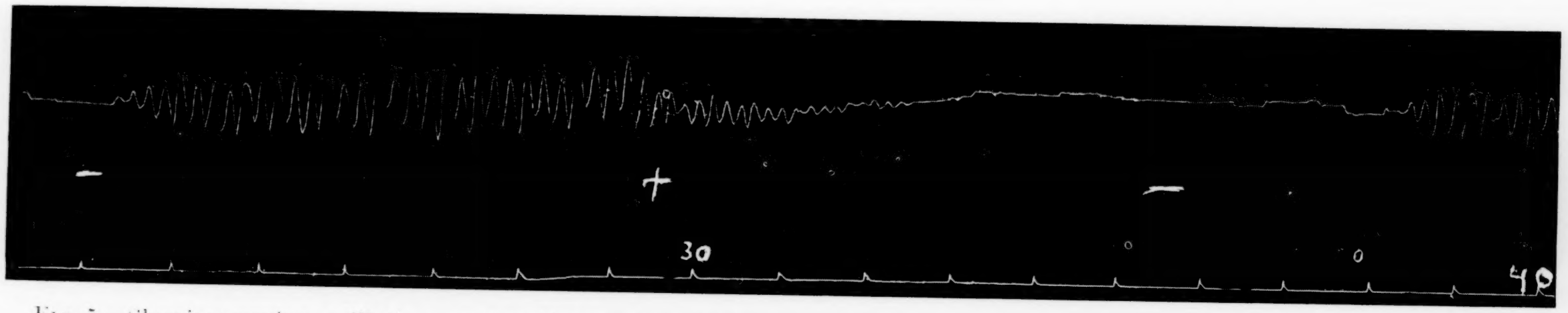

FIG. 5.—Showing varying oscillations produced by turning on or off an incandescent lamp. Large lamp is turned out at twenty third second, pendulum nystagmus with frequency of 5.4 a second appears; lamp on at thirtieth second, nystagmus lessens—6.25 oscillations in thirtieth and thirty-second seconds; lamp out at thirty-sixth second, nystagmus begins again at thirty-ninth second.

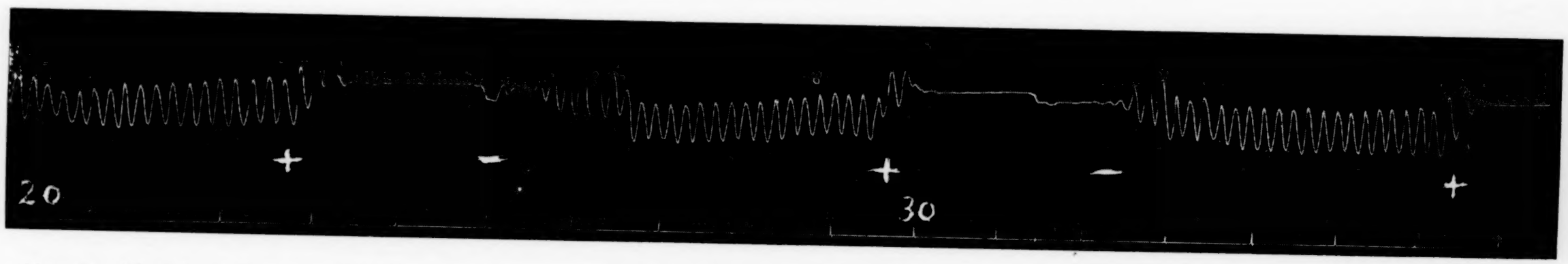

FIG. 6.—Showing effect on nystagmus of distance of the object fixed in vision. Nystagmus is present in the twentieth second when the object fixed is at a distance of 75 cm., but disappears in the twenty-third second when the object is 30 cm. distant.

tion of miners' nystagmus and optical rotatory nystagmus appears. Sometimes an onset of typical miners' nystagmus can be produced with the turning of the wheel.

The Shutting of the Lid.—A contrast exists between miners' nystagmus and the lid spasm which has attracted my attention since 1912. If a strong mental stimulus to shut the lid is applied, but actual closing is hindered by counterpressure of the fingers, nystagmus ceases temporarily.

Movement and Attitude of the Body.—There are many patients in whom nystagmus is absent when the head is still and upright, but in whom it immediately appears if the head is bowed forward 15 to 20 degrees. It becomes still stronger when the head is inclined so far that the ear-eye line is vertical. If the nystagmus still does not appear, it can frequently be produced by making the patient bend up and down quickly five to ten times. As a rule the onset of nystagmus is then short. The influence of the side and back position must also be considered. Sometimes miners' nystagmus can be produced by turning around the vertical axis of the body—*e.g.*, by turning to the left—while turning to the right has no effect. The influence of body movements is stronger in the dark than in the light.

Medicines.—Alcohol and certain sedatives such as adaline and veronal can suppress nystagmus completely for a certain length of time. Hence it follows that quiet attitude, bright light, lowering of the glance, looking at objects near at hand, and alcohol (taken off and on) work against nystagmus; whereas unrest of the body, darkness, elevation of the glance, and looking at an object in the distance favor it.

The course of development of nystagmus may be briefly described as follows: First of all it appears during work in the darkness after intense efforts in a stooping attitude, with the eyes uplifted. Gradually it extends further down over the field of vision. Later it can be observed in a quiet, upright attitude in the darkness, gradually in the light also, and in severe cases no part of the field of vision is free from nystagmus. Recovery occurs in the reverse order and requires two years and more in many cases.

2. Lid Spasm

Lid spasm is completely absent in most cases. In some cases lid spasms, which for the most part do not completely shut the lid, are mixed with nystagmus in longer or shorter intervals (Fig. 7). In other cases they obscure the field so much that it is difficult to mirror the eyes and to detect nystagmus. But by longer examination the diagnosis of nystagmus can generally be secured. The real miners' blepharospasm is involuntary and cannot be suppressed. It has nothing to do with photophobia, as many believe, because it also exists in nearly undiminished vigor in complete darkness, as nystagmography shows. In contrast to nystagmus, blepharospasm can, of course, be simulated.

3. Tremor of Rest of Body

In older miners tremor can be observed also in parts of the body other than the eye—*e.g.*, forehead, chin, neck, hands, and legs. With regard

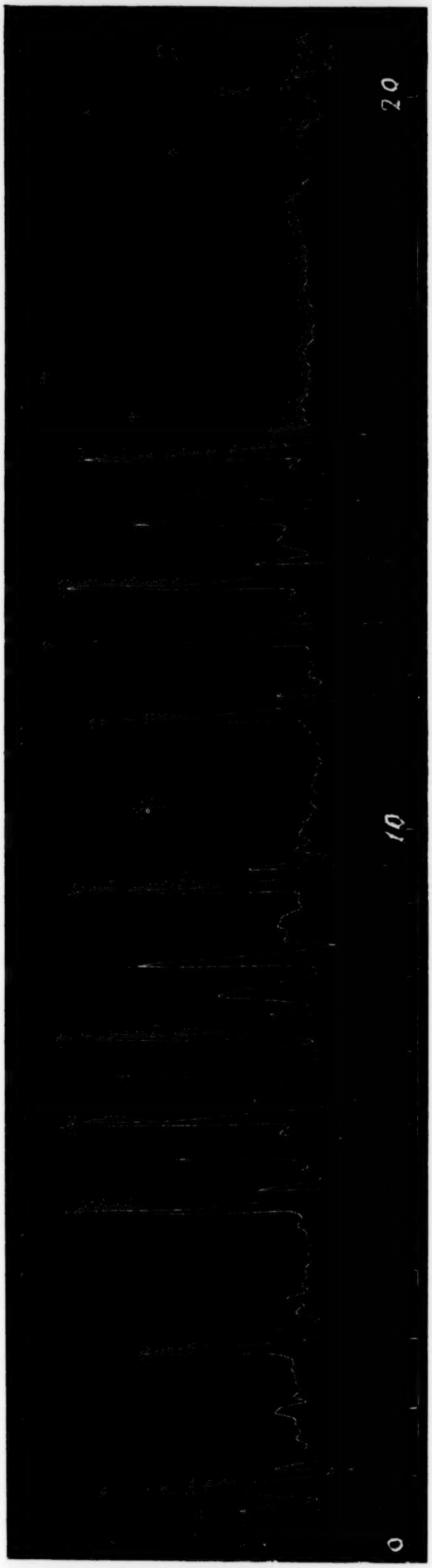

FIG. 7.—Showing lid spasms mixed with nystagmus; 288 oscillations in one minute.

to the experiences which I have had with spasmus nutans, which will be referred to later, I am led to believe that it is possible that a part of these tremor forms, especially tremor of the muscles of the neck, belongs to the picture of miners' nystagmus. A great many, especially tremor of the hands and legs, are due to other causes such as age and alcoholism. Although there are abstinent men among the nystagmic patients, it cannot be doubted that a not inconsiderable proportion is addicted to alcoholism. Dr. Heger (Bottrop), a general practitioner, who has looked through my nystagmus list, found in it many men of his district who have been known to him as great drunkards for many years past. The inconstancy of nystagmus depends on alcoholic excesses in many cases. Strong doses of alcohol are capable of suppressing temporarily the severest nystagmus and heavy tremor of the legs and hands. When the effect is over, the motor unrest returns all the worse.

DIAGNOSIS

There is no one symptom that is characteristic of miners' nystagmus. If the totality of the symptoms is taken, however, one will be able, except in rare cases, to decide whether the disease is miners' nystagmus or some other form, congenital or acquired. For me the disease is sufficiently characterized by the three motion disturbances already cited. But there are many authors (*e.g.*, Rutten, Butler, Martin) who extend the definition of the disease and who would like to call it miners' neurosis. To Martin nystagmus is only a sign of the disease and not always the most conspicu-

ous one. He establishes a surprising similarity to the anxiety neurosis of soldiers. Eddison emphasizes the subjective symptoms. Creswell distinguishes two diseases: miners' nystagmus and miners' neurosis, both of which may be found in the same patient. Nystagmus especially may lead to miners' neurosis. These opinions find expression in the English Workmen's Compensation Act, where the original definition of the disease from the year 1907 has been altered (1913) to read: "The disease known as Miners' Nystagmus, whether occurring in miners or others and whether the symptom of oscillation of the eyeballs be present or not."

Llewellyn rightly considers this definition as too general, because it can be applied also to other diseases. He demands that diagnosis be based, not upon declarations of the patient, but upon examination. That has always been a matter of course in Germany. With us nystagmus is considered as the chief sign, and that is right, for it is the only sign that cannot be simulated. It is a general experience, which can be sufficiently proved by oculists, that where compensation is claimed the disease is very frequently simulated. That this occurs in England also is evident from the report by Fergus who, on the basis of his experience as a medical referee, considers a great diminution of vision as an accompanying circumstance never failing in miners' nystagmus and also present before the onset. I am quite certain, after many hundred inquiries extending over a number of years, that 75 per cent. of the nystagmic patients possess normal or nearly normal vision while the eyes are resting. Every inappropriate decision by a medical referee encourages simulation and neurosis.

For the following reasons also, nystagmus should be placed at the head of the list of symptoms: because the principal complaints of the patients—diminution of vision, dancing movements (*Scheinbewegungen*), double sight, headache, and giddiness—depend on it; and because it alone can serve to distinguish the condition from other diseases, as it is never found connected with other tremors such as those of soldiers, old people, hysteriacs, or neurotics.

I should like also to oppose making a distinction between latent and manifest nystagmus. It is not possible to distinguish two groups, because all nuances can be observed, from slight to severe cases. I also do not believe that a nystagmus observed by the surgeon is not felt by the patient, as it must make itself known through dancing movements.

I am also induced to my narrow definition of miners' nystagmus by consideration of two other diseases—namely, spasmus nutans and the nystagmus of young animals. Spasmus nutans is a disease picture which was first separated out from other diseases by the children's surgeon Raudnitz (Prague), in 1897. In children up to 2 years of age who live in dark dwellings in large towns, a nystagmus arises in the winter months which corresponds exactly to the light cases of miners' nystagmus with regard to course, development, amplitude, and frequency of the movements. It is not infrequently connected with head tremor and is usually cured in the summer months, but may return

again the next winter. I was repeatedly able to recognize the relationship between the two diseases; in the same family a man suffers from nystagmus caused by his work, but a little child suffers from spasmus nutans. In the year 1902 Raudnitz discovered by accident that young dogs shut up in a dark cellar are affected by nystagmus and head tremor also. I have verified this with good success since 1915 by experiments on puppies and kittens and found that, if they are shut up in a dark cellar soon after their birth, they are affected with nystagmus after some weeks, some of them after eleven days, and later with head tremor. Therefore I have included these three disease pictures in the terminology "dark tremor" (*Dunkelzittern*) and ask: Is there the slightest reason to speak of neurosis?

Effect on Working Capacity

There are many men affected with miners' nystagmus who continue working in the pit, in spite of their complaint, for many years. If a strike is in sight or if the wages fall, the men come to the surgeon and claim sick benefit and compensation; this has been the experience for many years past in Germany and in Great Britain. Hence many people draw the conclusion that miners' nystagmus is of no importance from the point of view of working capacity. This is an entirely false conclusion and one that is unjust to the patients. I have always considered the miner who does his work with severe nystagmus as a hero and a martyr, and I see that Llewellyn agrees with me.

If a surgeon has to give his opinion on a case, he should first examine the sight. If this procedure had been followed by all investigators, the present diversities of opinion could not exist. In order to form an unprejudiced opinion one should take twenty patients with otherwise healthy eyes and normal vision (before the onset), by whom simulation is out of the question, and test their vision. He will find that it is always impaired, in some cases to a lesser degree, in others to a higher degree—to vision of 1/20 and less—depending on the course, amplitude, and frequency of the oscillations. The patients not only see badly, but they are also continually vexed by dancing movements, in contrast to the men affected with congenital nystagmus, in which the movements are mostly different and connected with loss of the binocular vision. Recently I displayed at the health and labor exhibition at Essen-Ruhr an electrical apparatus, which illustrates the dancing movements of a perpendicular nystagmus with a frequency of three and six a minute and with an amplitude of 4 degrees. One only needs to let this dance of pictures act on himself for a time to know what discomfort must be connected with a severe nystagmus. That this state can lead not only to headache and giddiness, but also to neurosis after many years, is clear, even if the neurosis does not exist from the beginning.

Anyone who has a correct idea of the influence of nystagmus on the visual acuity of the eyes, will be able to judge the working capacity of the patients in some measure, if he considers the conditions under which nystagmus arises. A severe nystag-

mus existing in all visual directions in daylight leads to complete incapacity for work even on the surface; while a nystagmus that begins only in the darkness when the eyes are uplifted does not hinder work in daylight at all and even allows many to work in the pit. In Germany a workman is considered unfit for work as a miner when he shows nystagmus in the dark with his eyes directed straight forward.

Causes

Because only workmen in coal mines (the few cases of nystagmus which were found by Stassen in the ironstone mines do not change this statement), and these only to a certain extent, are affected with nystagmus, the cause of the disease must lie partly in the peculiar conditions of mine work (external causes), and partly in the personal circumstances (internal causes).

External Causes

Consideration has for a long time been given especially to height of the seams, illumination of the mine, and poisonings. To discuss a bacterial cause (Fergus) is not necessary.

Former authors, especially Dransart and Snell, believed the strained uplifting of the eyes, which is necessary for work in a stooping or reclining position ("holing"), to be the cause of nystagmus. Later came the hypothesis of deficient light, which is held especially by Court, Llewellyn, and the Oxford Ophthalmological Congress (1912). Recently poisonings, which were named as the cause by Schröter (1871), Reuss, and Pechdo, have been pointed out again by Robson (Wales).

I do not wish to discuss here the extensive proof produced by various authors with regard to the mine conditions, but wish only to ask a question: Which hypothesis is supported or rejected by the disease picture itself? There is no doubt that deficient illumination of mines is the chief cause of miners' nystagmus. This can be proved first of all by observations on the patients themselves. There are many cases in which the onset of tremor can be produced only by diminution of the light; bright light exerts a calming influence, diminishing the amplitude and increasing the frequency. Another conclusive proof lies in the resemblance of miners' nystagmus to the dark oscillation of the little children and animals previously mentioned, which, curiously, has not up to the present time been considered at all in the English literature. The authors who attribute an essential rôle to poisoning must be prepared with an explanation of the dark oscillation. Poisoning does not enter into consideration for the children and animals, although I will not deny that nystagmus occurs after poisoning, *e.g.*, with nicotine and veronal.

Deficient illumination does not, however, explain the whole disease picture. The influence on the disease of the direction of vision and the attitude of the body shows clearly that other circumstances co-operate—namely, stooping and exertion in "holing." If these conditions ceased—that is, if the men could work in an upright position and if they did not have to make the vigorous movements—staying for seven or eight hours in the badly illuminated pit would probably not be sufficient in most cases to cause

nystagmus. This view is supported by the remarks of Marshall in regard to conditions in the United States, where the men work in an upright position and make use of machine power to a much greater extent. It is admitted, however, that in the United States the illumination also is better, owing to the general use of the electric cap lamp.

The illumination affects the optic nerve; the position of the body, and probably that of the eyes also, affects the vestibular nerve. It is well known that these nerves are the apparatus which regulates the position of the eyes, in the first place, and this is an added reason for considering nystagmus as the chief symptom.

Internal Causes

Many investigators reduce miners' nystagmus to error of refraction, mixed astigmatism, and presbyopia (Romiée, Ross, Mackenzie, Anderson). According to Anderson, nystagmus, which effects working disability, is said not to occur in emmetropia. Such views can easily be refuted by my statistics which show that the greater part of the nystagmic patients possess rather good eyes with regard to vision and state of refraction. Other defects also are relatively infrequent. Heterophoria cannot be held as a cause. The only factor remaining to be considered is a deficient light sense in many cases (Weekers, Ohm) which is compensatory to the deficient illumination. Furthermore, there is no doubt that among the nystagmic patients, besides individual teetotallers and many temperate men, there are a great many alcoholics. Although alcoholism itself never produces nystagmus, it acts as a predisposing factor partly by impairing the light sense, partly by injuring the vestibular apparatus.

As to nationality, I have found that Poles suffer from nystagmus much more frequently than Germans.

The external causes can be expressed by the formula $\frac{R}{B}$, in which R signifies all the working conditions which irritate the labyrinth, such as any unusual attitude of the head and the shaking of the body during "holing;" and B corresponds to the illumination. The stronger R is and the worse B is, the sooner nystagmus appears.

The internal causes can be expressed by the formula $\frac{V}{A}$. V indicates the sensitiveness of the vestibular apparatus, which cannot yet be described more exactly. That it is different in each case, can be proved through the difference in susceptibility to seasickness. A represents the total efficiency of the eyes, which in the case of miners refers chiefly to the light sense. The more irritable the labyrinth and the more inferior the quality of the eyes, the greater is the danger of nystagmus.

Prophylaxis

From the foregoing, the following recommendations as to prophylaxis in nystagmus may be drawn.

1. The illumination should be improved. All the improvements which bring more light to the miner during his stay in the pit—*e.g.*, improvement in his safety lamp, illumination of the roads with stronger electric lamps, and whitewashing—work against nys-

tagmus. In the first place the intensity of the light, not the colors (Elworthy), is of consequence.

2. Mechanical apparatus (machines) should be introduced to support and replace human working power.

3. Alcoholism should be resisted.

4. Members of families in which several cases have already appeared and people with deficient light sense should be advised not to undertake pit work.

Theory

Theory of miners' nystagmus can be only briefly touched upon in the scope of this paper. Many believe that the restlessness of the eyes arises through the losing of objects by the fovea in the darkness and their being picked up by the periphery. This opinion is not supported by the disease picture. I will only say against it that the extent of the fovea is not lost by an oscillation of small amplitude, nor, further, by rotatory nystagmus. Nor can the numerous forms of dissociated oscillation be explained by the theory of loss of the fovea.

Former opinions based on quite insufficient knowledge of nystagmus must be given up. I believe frequency of movement to be the most important sign of nystagmus. Under normal conditions the muscles of the eyes receive pendulum stimulations of very small amplitude and high frequency. They are influenced by the optic and vestibular nerves. Both by longer detention of the light and by unusual irritation of the vestibular apparatus stimuli of greater amplitude and of lower frequency may also serve to excite the eye muscles, resulting in an intermittent periodic stimulation of the muscles which becomes recognizable as nystagmus to the ordinary observer.

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A NEW TYPE OF HOSE MASK FOR PROTECTION AGAINST METALLURGIC DUSTS AND FUMES*

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IN THE process of smelting certain Rocky Mountain copper ore, the fumes and dusts evolved are found to contain arsenic, copper, and sulphur, high concentrations of arsenic trioxide, appreciable amounts of lead, silver, and zinc in the form of finely divided fume particles, and, as gases, traces of sulphur trioxide and sulphur dioxide. These products of combustion are conducted to a large stack by flues a quarter of a mile long, and, during their transit, much dust and fume are deposited on the walls and floor of the flues, to be reclaimed later and refined for their arsenic content. The gases and finely divided fume which succeed in making their way through the flues are then collected as they pass through Cottrell treaters and the particles which adhere to the plates are shaken off at intervals into hoppers placed below.

The men who work at these processes are, of necessity, exposed to dusty and gaseous atmospheres which are dangerous, if not wholly irrespirable. Many means of protection have been tried and in each instance they have been found unsuited to the needs of the plant. Gas masks which are intended to protect against gases in concentrations of 3 per cent. or less[1] are inadequate; and when gas masks can be used with safety, under our conditions their filters soon plug up and breathing becomes difficult. The conventional type of hose mask, like the gas mask, is hot and uncomfortable for the wearer. Moreover, since the atmosphere in which the work is done is generally corrosive, it is very desirable that the protective device be made of cheap material which can be often and easily replaced.

The device shown in Figures 1, 2, and 3, which was perfected by one of our engineers, has successfully met the conditions which we encounter, and can be made in any plant from materials that are inexpensive and easily obtained. It consists essentially of a protective helmet, with suitable eyepieces, from which is suspended a length of ordinary muslin (Fig. 1). The helmet is made of vulcanized fiber $\frac{1}{32}$ inch thick; the vertical circular band is 4 inches high and 13 inches in diameter. Two pieces of photographic glass $3\frac{1}{2}$ by 5 by $\frac{1}{32}$ inches are put on heated curved forms in an electric muffle

*Received for publication June 4, 1926.

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until they seat, and are then held in the helmet by a tin frame. Inside the helmet is a wrapped halo, or crown, on which the head rests and from which streamers extend to tie under the chin (Fig. 2). A cylinder of muslin a yard long, with two armholes, is attached to the helmet and is held firmly in place by a narrow strip of muslin tied around the waist. If the muslin of the cylinder wears out rapidly, a more durable fabric like wool may be substituted.

Fresh air at a pressure of from 3 to 6 ounces is supplied by a blower or compressed air line. The air passes through a length of hose or rubber tubing to which is attached a thin galvanized funnel, three-fourths of an inch across. A few thicknesses of fine gauze are placed over the funnel to diffuse the air current, and the whole is suspended around the neck of the wearer under the muslin cylinder (Fig. 3). We have found that hand blowers can furnish air to five or six men and provide each with adequate ventilation within the hose mask. The excess air supplied by the air line and the expired breath pass out of the cracks and crevices of the mask, and no moisture or fogging on the windows of the mask obscures the vision.

FIG. 1.—A new hose mask.

FIG. 2.—Showing the hose connection and method of attaching the helmet under the chin.

FIG. 3.—Inside of vulcanized fiber helmet showing method of fastening glass windows to the helmet and of attaching the replaceable muslin covering.

STUDIES IN THE CONTROL AND TREATMENT OF "NICKEL RASH"*

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IT HAS long been recognized that the skin affection known as nickel rash, which is characterized by great itching, occurs in men working at nickel plating and nickel refining. The many speculations advanced to account for the rash have never aided to any extent its prevention or treatment, and its sporadic occurrence has added to the difficulty of its systematic study and the attainment of a method of control.

In the early part of 1924 at the request of the International Nickel Company of Canada, Limited, an investigation was undertaken by us into the etiology and means of control of a rash occurring among the men engaged in refining nickel. This investigation continued till the end of December, 1925.

The arrangements made with the Company were such that whenever a rash occurred the patient was sent to the first aid department. Here he came under our observation and obtained treatment. At first it was very difficult to get the cases early but after a few months a good will was established between the men and ourselves and in only a few instances did any of them refuse to follow our instructions.

The refinery of the International Nickel Company of Canada, Limited, is located in the town of Port Colborne. This refinery treats matte received from the smelter of the Company at Copper Cliff, Ontario, where the mines are located. This matte, which contains approximately 55 per cent. of nickel, 25 per cent. of copper, and 20 per cent. of sulphur, is processed in five different buildings to fine nickel and copper.

The refinery process starts in building 1, where the matte is mixed with coke and niter cake. The niter cake, which is a by-product of the acid making industry, is, chemically, acid sodium sulphate. The mix is charged into cupolas, the product of which is collected in large cast-iron pots, where the molten mass is left to cool. As a result of the chemical reactions that take place in this treatment, the top portion of the cooled mass contains the copper and the lower portion the nickel, as sulphides. It is necessary to re-treat these tops and bottoms a second time in cupolas, with coke and niter cake, in order to get them sufficiently free from each other. The copper tops are finally

* Received for publication May 6, 1926.

treated in Bessemer converters and cast into large slabs known commercially as blister copper, and marketed as such.

The nickel bottoms are transferred to building 2 and crushed and milled to a powder. This powder is then leached with water and finally with weak sulphuric acid. The washed sulphide is then taken to building 3, where it is given two calcinations, the first with salt, and the second with soda ash (sodium carbonate). After the second calcination there is a final leaching with water and weak acid.

The product from these calcinations and leachings is black oxide of nickel. This oxide is now ready for the market, or goes to the next step in the process which is carried out in building 4. Here the oxide is mixed with charcoal and melted in large oil fired furnaces and cast into ingots, shot, or anodes. The ingots and shot are marketed; the anodes are taken to building 5, where they are refined electrolytically to the purest form of nickel produced.

As one would expect, the processes in the various buildings greatly affect the worker's environment. This is discussed in detail in other sections of this paper.

FIG. 1.—Severe long-standing case of nickel rash. Patient also had the rash on the legs and neck.

In our series of cases the rash was of two more or less distinct types depending on the character of the man's work. Men who worked around the furnaces where it was extremely hot and fairly dusty had a rash which occurred mostly on the exposed flexor surfaces of the forearms, on the wrists, elbows, neck, forehead, and the upper part of the chest, which was usually bare of clothing. Some of the men also had the rash on the medial surface of the thighs, behind the knees, in the axillae, and on the abdomen. The rash started as small papules which seemed to be situated at the mouths of the pores. It was attended by severe burning and itching which was greatly accentuated by exposure to

heat when the patients were at work, especially if sweating occurred, or when they got warm in bed. In the milder cases the skin between the papules was apparently healthy but in the more severe cases the whole skin was greatly inflamed and swollen. In these cases the papules became vesicles which ruptured and exuded serum; the skin became fissured and also wept freely so that the condition resembled a severe, acute weeping eczema (see Fig. 1).

The second type of rash occurred generally in those employees who worked in the electrolytic building and were exposed to a hot, moist atmosphere. This rash was worst in patients who were susceptible to external irritations, such as poison ivy and grain dusts, and seemed to follow a loss of the normal, protective fatty substances of the skin, inasmuch as those whose skin remained soft and moist did not seem to be affected. The rash started as an erythema of the exposed surfaces of the arms, neck, and face, especially, and was characterized by a burning and itching intensified by a hot environment. These cases, unless treated early, acquired the features of the type of rash first described. In one severe case a true exfoliative dermatitis of the face, neck, forearms, and hands developed, this case occurring in the only patient whose palms were affected; it is interesting to note that he was extremely susceptible to poison ivy and grain dust irritation. The patients who worked in the electrolytic process were very subject to relapse after apparent cure. A further exposure of eight hours was enough to cause a complete relapse in some men, whom it was therefore necessary to transfer to other departments of the plant. In both types of rash the men complained that a burning, itching sensation of the skin preceded the appearance of the rash.

Analysis of the cases coming under our observation during 1924 and 1925 shows that 63 per cent. of these were in men of fair complexion. In view of the fact that the majority of the employees are foreigners, naturally dark skinned, this preponderance of rash in the fair-skinned men is worthy of note. Forty per cent. of the cases occurred in men of the Anglo-Saxon race, 20 per cent. in men of French nationality, and the remaining 40 per cent. was fairly equally distributed among men of Austrian, Polish, German, Roumanian, Russian, and Italian nationalities. The average age was 30.4 years, the youngest being 18 and the oldest 55 years. Sixty per cent. of the incidence was in married men. The average length of exposure before the rash occurred was nine and a quarter months; 46.6 per cent. of the cases occurred after six months' exposure or less, and 17.7 per cent. after an exposure of one month or less. The shortest exposure was one week and the longest thirty-one months.

In 1923, the year previous to our investigation, 43 cases of nickel rash occurred in the whole plant, 22 men losing time. The total time lost was 4,016 hours, or an average of 93.4 hours per case. During 1924, the first year of our study, there were 22 cases, 4 men losing time. The number of hours lost was 408, or 18.5 hours per case. In the last year, 1925,

TABLE 1.—SHOWING PREVALENCE OF NICKEL RASH DURING SUMMER MONTHS OF THE THREE YEARS 1923, 1924, AND 1925, AND ITS DIMINUTION AFTER TREATMENT

MONTH	WHOLE PLANT			BLDG. 1			BLDG. 2			BLDG. 3			BLDG. 4			BLDG. 5		
	No. of Cases	Cases Per 100,000 Working Hrs.	Hours Lost	No. of Cases	Cases Per 100,000 Working Hrs.	Hours Lost	No. of Cases	Cases Per 100,000 Working Hrs.	Hours Lost	No. of Cases	Cases Per 100,000 Working Hrs.	Hours Lost	No. of Cases	Cases Per 100,000 Working Hrs.	Hours Lost	No. of Cases	Cases Per 100,000 Working Hrs.	Hours Lost
During the Year 1923																		
Jan.	4	2.56	557.2	..	....	.....	..	....	.....	..	.....	.....	..	.....	...	4	45.6	9,936
Feb.	5	2.69	860.6	..	....	.....	..	.....	.....	..	.....	.....	..	.....	...	4	45.0	12,612
March	1	0.60	169.0	..	....	.....	..	.....	.....	..	.....	.....	..	.....	...	1	10.4	2,912
April	4	2.38	100.9	..	....	.....	2	14.9	.....	1	3.03	267.0	..	.....	...	..	.....	.....
May	2	1.07	.....	..	....	.....	..	.....	.....	2	5.30	.....	..	.....	...	..	.....	.....
June	2	1.02	98.3	1	1.63	130.6	1	6.1	690.5	..	.....	.....	..	.....	...	..	.....	.....
July	13	6.33	179.3	..	....	.....	6	35.2	1,223.0	3	7.10	360.0	1	8.07	581	2	31.4	.....
Aug.	4	1.89	132.1	1	1.47	.....	1	5.4	1,182.0	..	.....	.....	..	.....	...	2	30.8	.....
Sept.	5	2.51	176.8	..	....	.....	2	11.9	906.0	2	4.70	.....	..	.....	...	..	.....	.....
Oct.	1	0.62	74.7	1	2.02	275.4	..	.....	.....	..	.....	.....	..	.....	...	..	.....	.....
Nov.	1	0.67	10.7	..	....	....	..	.....	.....	1	3.60	.....	..	.....	...	..	.....	.....
Dec.	1	0.69	60.4	..	....	.....	..	.....	.....	1	3.00	269.0	..	.....	...	..	.....	.....
Totals	43[1]	....	.....	3	....	.....	12	.....	.....	10	.....	.....	1	.....	...	13	.....	.....
During the Year 1924																		
Jan.	1	0.64	56.2	..	....	.....	..	.....	.....	1	3.12	274.2	..	.....	...	..	.....	.....
Feb.	1	0.65	.....	1	2.03	.....	..	.....	.....	..	.....	.....	..	.....	...	..	.....	.....
March	..	....	.....	..	....	.....	..	.....	.....	..	.....	.....	..	.....	...	..	.....	.....
April	1	0.65	26.2	..	....	.....	..	.....	.....	..	.....	.....	..	.....	...	1	11.44	457.5
May	4	2.34	93.6	..	....	.....	..	.....	.....	..	.....	.....	..	.....	...	4	43.11	1,724.0
June	6	4.14	49.7	..	....	.....	1	0.90	64.6	4	11.40	.....	..	.....	...	1	11.47	.....

July	4	3.32	39.9	..	....	.....	3	31.41	502.4	..	.....	.....	1	13.9	...	..	.....	.....
Aug	3	2.70	.....	2	6.98	.....	..	.....	.....	1	3.81	.....	..	.....	...	..	.....	.....
Sept	2	1.93	.....	..	....	.....	..	.....	.....	1	4.36	.....	..	.....	...	1	18.91	.....
Oct	..	....	.....	..	....	.....	..	.....	.....	..	.....	.....	..	.....	...	..	.....	.....
Nov	..	....	.....	..	....	.....	..	.....	.....	..	.....	.....	..	.....	...	..	.....	.....
Dec	..	....	.....	..	....	.....	..	.....	.....	..	.....	.....	..	.....	...	..	.....	.....
Totals	22	....	.....	3	....	.....	4	.....	.....	7	.....	.....	1	.....	...	7	.....	.....

During the Year 1925

Jan	1	0.68	.....	..	....	.....	..	.....	.....	..	.....	.....	1	7.68	...	..	.....	.....
Feb	..	....	.....	..	....	.....	..	.....	.....	..	.....	.....	..	.....	...	..	.....	.....
March	..	....	.....	..	....	.....	..	.....	.....	..	.....	.....	..	.....	...	..	.....	.....
April	3	2.30	.....	..	....	.....	..	.....	.....	3	8.01	.....	..	.....	...	..	.....	.....
May	1	0.61	.....	..	....	.....	..	.....	.....	1	2.46	.....	..	.....	...	..	.....	.....
June	3	1.86	44.6	..	....	.....	..	.....	.....	3	7.61	182.7	..	.....	...	..	.....	.....
July	3	2.39	....	..	....	.....	1	9.38	.....	1	2.34	.....	1	10.23	...	..	.....	.....
Aug	5	3.12	.....	1	2.03	.....	..	.....	.....	3	7.35	.....	..	.....	...	1	13.92	.....
Sept	3	1.81	.....	..	....	.....	2	16.0	.....	..	.....	.....	..	.....	...	1	14.86	.....
Oct	3	1.80	.....	1	2.39	.....	1	8.26	.....	..	.....	.....	..	.....	...	1	8.43	.....
Nov	1	0.65	.....	..	....	.....	..	.....	.....	1	2.48	.....	..	.....	...	..	.....	.....
Dec	..	.....	.....	..	....	.....	..	.....	.....	..	.....	.....	..	.....	...	..	.....	.....
Totals	23	....	.....	2	....	.....	4	.....	.....	12	.....	.....	2	.....	...	3	.....	.....

[1] There were four scattered cases which are included in this total, occurring one each in February, April, July, and September.

there were 23 cases, and only 1 man lost time. The total time lost was 72 hours, or 3.1 hours per case.

Table 1 shows, for each month during the last three years, the number of cases occurring, the number of cases per 100,000 working hours, and the time lost in hours per 100,000 working hours.

The figures show that there were a considerable number of cases and a great loss of time during 1923. A relatively large number of cases and a great loss of time are shown during January and February in building 5, where it is interesting to note that about one-half of the cases, accounting for about half the lost time, occurred in men recently employed. The conditions in this building are usually hot and humid, for even in the colder months high temperatures are maintained in order to prevent condensation. During 1924, the number of cases and the time lost in the whole plant were greatly reduced; and in 1925, although there was one more case than in 1924, the lost time was much less. In 1924 the total hours of exposure amounted to 81 per cent. and in 1925 to 90 per cent. of that of 1923.

Table 1 shows also that during 1923 more cases occurred in building 5 than in any one of the other departments; while in 1924 and 1925 the number occurring there was materially reduced. The progressive improvement shown in this building by the decline in the number of cases and by the reduction in time lost was probably due, apart from treatment, to a more careful regulation of the ventilation, or, more specifically, of the cooling power, in that building during the years 1924 and 1925.

During the three years, about the same incidence of nickel rash occurred in buildings 1 and 4. In 1923 there was a considerable loss of time, while in 1924 and 1925 no time was lost.

In building 3 the greatest number of cases occurred in 1925. There were fewer in 1924 than in 1923, but the time lost in 1924 and 1925 was only a fraction of that lost in 1923. The hours of exposure in building 3 were greater in 1923 than in 1924 or 1925. Nearly all of these cases occurred among the men who worked at the calcining furnaces. This part of the process consists in working the red-hot nickel salts through the calcining furnaces by hand rakes. It is a hot, dusty job and requires a considerable expenditure of muscular energy.

In building 2, during 1923, the incidence of nickel rash was much greater than in 1924 and 1925. The time lost in 1923 was high, while in 1924 it was much less, and in 1925 no lost time occurred.

It may further be seen from Table 1 that in the three years the majority of cases occurred during the summer months. This is of interest, as from our experience heat appears to be one of the important factors in the causation of nickel rash.

During the summer of 1925, because of the association of heat and nickel rash, several observations were taken with the kata-thermometer in three different buildings. The figures from these observations are given in Table 2. The readings were taken, as a rule, at weekly intervals and show only in a general way the existing conditions. It is seen that the

atmospheric conditions in building 5, with the exception of those on June 18 and 25, never showed a suitable cooling power, even for the most sedentary type of work. Indeed, most of the figures show that conditions were uncomfortably hot. It is of interest to note that the southwest wind, when the outside cooling powers are taken into consideration, gives relatively better cooling powers than winds from other directions. The beneficial result from a southwest wind in building 5, which is shielded from all but southwest winds, is due to its position.

In building 3 (see Table 2) it is very warm and on many days all heat lost from the body must be by evaporation of sweat. The relatively high wet kata cooling powers are accounted for by the high wind velocity occurring in this building. The observations in building 2 were taken in the large leaching vats, as it is the men who shovel the leached nickel salts from these vats who get nickel rash. The cooling power here is always deficient, owing to the fact that the material shoveled is hot and wet, and the walls of the vat prevent any appreciable degree of air movement.

TABLE 2.—KATA-THERMOMETER OBSERVATIONS TAKEN IN THREE BUILDINGS DURING THE SUMMER OF 1925

DATE	BLDG. 5			BLDG. 3			BLDG. 2			OUTSIDE OBSERVATIONS			WIND DIRECTION
	Cooling Power		Temperature	Cooling Power		Temperature	Cooling Power		Temperature	Cooling Power		Temperature	
	Wet Kata	Dry Kata		Wet Kata	Dry Kata		Wet Kata	Dry Kata		Wet Kata	Dry Kata		
			°F.			°F.			°F.			°F.	
June 12.....	14.4	2.0	89.5	22.2	0.0	95.0	13.6	2.0	89.5	32.6	6.4	81.5	N.E.
June 18.....	17.0	7.0	75.0	16.5	0.0	95.0	12.0	2.7	83.0	30.0	11.7	76.0	S.W.
June 25.....	18.0	5.6	70.0	20.0	5.3	75.0	17.0	5.4	75.0	43.0	17.0	62.0	N.W.
July 2.....	12.0	3.0	82.0	19.0	0.0	95.0	....	....	....	34.0	11.4	71.5	N.W.
July 10.....	13.7	3.7	81.5	18.0	...	91.5	12.0	3.0	87.0	28.0	7.1	76.0	N.W.
July 16.....	17.0	5.3	79.0	26.0	4.6	89.0	....	....	....	22.0	9.4	73.5	S.W.
Aug. 6.....	16.0	3.6	82.0	24.0	5.6	88.0	....	....	....	25.0	6.8	76.0	S W.
Aug. 13.....	16.0	4.3	82.0	22.0	4.1	86.0	....	...	....	24.0	6.1	79.0	S.W.
Aug. 19.....	16.0	4.4	83.0	32.0	3.9	87.0	11.0	2.7	86.0	24.0	4.9	78.0	S.W.
Aug. 26.....	18.0	4.8	73.0	23.0	3.6	88.0	25.0	5.7	83.0	36.0	13.0	66.0	N.E.
Averages...	15.8	4.3	79.7	22.2	3.0	88.9	15.1	3.5	83.9	29.8	9.3	73.9	

Discussion

Our investigation of nickel rash was carried out on the following lines:

1. Is the Rash the Direct Result of Irritation Caused by Materials Handled (Nickel or Nickel Salts)?—That nickel or other substances might cause the rash, by direct irritation, seems improbable. In certain parts of the plant where nickel is handled directly there are few cases, and in

those buildings where the incidence of nickel rash is high, factors other than contact with nickel material appear to govern the cause and severity of the rash. The electrolytic fluid from building 5 was applied to the ears of rabbits daily for several months. White rabbits were used and the electrolyte was applied to one ear of each rabbit, the other ear being used as a control. In no instance did the ears that received the daily application of electrolytic fluid show any signs of irritation. It is interesting to know also that the electrolytic fluid on chemical examination showed no arsenic.

From these experiments, and from the history of the cases, we concluded that nickel rash was not directly due to contact with irritating substances.

2. Does Nickel Become Ingested and Produce a Chronic Poisoning Accompanied by a Skin Lesion?—From a study of the past work on the toxicology of nickel and its compounds it would appear that nickel and the ordinary nickel salts, taken in small amounts, are not poisonous. Nevertheless, feeding experiments were undertaken in which rabbits were given daily 25 mg. per kilo of nickel sulphate by a stomach tube over a period of several months. No change or disturbance of any of the bodily functions was observed in these experimental animals. From this we concluded that nickel in such small doses as the workmen would get was not poisonous. This conclusion has been recently substantiated by Drinker and others (1) who investigated the use of nickel vessels as cooking utensils.

3. Do Men with Nickel Rash Show Any Consistent Pathologic Changes in the Blood?—From a large number of the cases blood was taken and the non-protein nitrogen, uric acid, urea, chlorides, calcium, and inorganic phosphates were determined. In all the bloods examined nothing consistent was found that would point to the cause of nickel rash. Some results were obtained, however, in the uric acid values by using different methods of analysis, which led to the study by Bulmer, Eagles, and Hunter (2), and subsequently to the isolation by Hunter and Eagles (3) of a new substance from blood corpuscles.

4. Are the Materials Handled Infected with Bacteria?—It was noticed that a scum formed on the top of the electrolytic tanks which were not in use in building 5. This scum, on bacteriologic examination, showed bacteria and fungi. The electrolytic fluid in the tanks which were being used proved on examination to be sterile. As the men are in contact practically all the time with the materials in the tanks which are in use and at very infrequent intervals with the materials in the unused tanks, it is not reasonable to ascribe the cause of the rash to infection from bacteria or fungi in building 5.

5. Special Susceptibility.—In regard to the special susceptibility of certain types of workmen to this rash, our experience, as mentioned before, is that fair-skinned people are much more subject to nickel rash than dark-skinned people. A point of interest is that in several cases of the rash in building 5 the patients were also sensitive to foreign proteins.

6. Effect of Diet.—An investigation of the diet of the men suffering from the rash revealed nothing. A low protein and high carbohydrate diet did not improve the condition. In one case the patient said that the eating of tomatoes aggravated the rash.

7. Influence of Hard Work.—The influence of hard work is an important factor if sweating is produced, that is, when the heat regulating mechanism of the body becomes more or less strained, as occurs among the furnacemen in building 3.

8. Personal Habits.—Most of the men examined were clean in habits; in a few, however, the condition was much aggravated by dirtiness. In many cases the rash was made much worse by washing with strongly alkaline soaps and washing powders, and in some cases the use of alkaline cleansers was one of the most important factors precipitating the rash.

9. Effect of Dust.—Fine nickel dust is a factor in the cause of the rash only when the environment is hot and much sweating is produced. Such conditions exist in buildings 2 and 3.

10. Effect of Heat.—Heat appears to be the most important single contributory factor in the onset and continuance of nickel rash. As stated before, nearly all cases occurred during the summer months. It is our experience that the number of cases is increased in very hot weather, and that the condition is aggravated by hot working conditions. Men with the rash who were unable to work during the day in hot weather were able to work at the same job at night without discomfort. The effect of heat on the rash was recognized by the men and without exception they complained that heat made the rash worse, especially if profuse sweating was induced.

We may here consider some of the effects of heat on the body. Pemberton (4) in summarizing the effects of external heat on the body says: "Exposure of the body to the therapeutic application of external heat results in a heightened bloodflow, an increased metabolism and in the elimination of acids, chiefly carbon dioxide which escapes through the lungs, urine and sweat in the order of magnitude named. This leaves an excess of alkali in the blood which then changes its reaction, becoming more alkaline. In the compensatory effort to meet this situation, the excess of alkali is eliminated through the sweat and urine."

Pemberton and Crouter (5) in a study of the hydrogen ion concentration of sweat, during electric bakes, found that normally sweat was slightly acid or neutral, but that after subjection of an individual to external heat the sweat became more alkaline, and that if the bake was continued over a period of time the sweat became markedly more alkaline.

It is well known also that the skin temperature is considerably higher in hot than in cool places, and that, within certain limits, an increase in the temperature of a tissue is followed by a corresponding increase in its irritability.

It is highly probable that the men at hot occupations at Port Colborne would show some degree of these changes and have an increase in the hydrogen ion concentration of the blood and the sweat. The alkaline sweat would undoubtedly remove

much of the protective fatty substances of the skin and greatly reduce its natural protection. This effect with an increased skin temperature would greatly reduce the skin's resistance to materials handled, and would thus allow materials which are ordinarily not irritating to produce much irritation. It is interesting to note here that in testing sensitivity to protein the protein must be applied to the skin in an alkaline medium.

It would appear then that, apart from correcting the ventilation and providing a cooler atmosphere for the workmen, a logical treatment for these cases of rash would be the internal administration of some medicament which would combat this tendency toward alkalosis and alkaline sweat.

From the work of Gamble, Ross, and Tisdall (6) and later of Salvesen, Hastings, and McIntosh (7), and others, it has been shown that the ingestion of calcium chloride in large amounts produces an acidosis due to the absorption from the alimentary tract of the chlorine of the calcium chloride without the calcium. Thus, the giving of large doses of calcium chloride would combat the increased hydrogen ion concentration of the blood and the sweat caused by a hot environment and would have a tendency to keep the reaction of the skin normal. With its reaction normal, the liability of the skin to irritation by the materials handled would be greatly reduced.

Treatment

With these considerations in mind the use of calcium chloride is indicated in the treatment of cases of nickel rash.

The patients were accordingly given calcium chloride in large doses three times a day, and a suitable lotion, usually calamine, was supplied for local application. The results were very gratifying, for both the incidence of the rash and the time loss due to it were greatly lessened, as is shown in Table 1. This treatment was given in all our cases except a few in which a vaseline was substituted for the calamine lotion.

The year before our investigation, 51 per cent. of the patients contracting the rash lost time, while during the two years that calcium chloride was used 18 per cent. and 4.3 per cent., respectively, lost time. During the period before the treatment with calcium chloride, recurrence of the rash in patients was very common; during the calcium chloride régime, this seldom occurred. Moreover, under our treatment recovery took place in most cases while the men remained exposed.

In 1923 and in previous years calamine lotion alone had been used with unsatisfactory results. This negative evidence further tends to support our belief that calcium chloride has a definite beneficial action in these cases.

Conclusions

1. An insufficient cooling power in the worker's environment is the most important single factor in the causation of nickel rash.

2. An increased skin temperature allied with an alkaline sweat increases the irritability of the exposed parts,

lowers their resistance, and increases their susceptibility to irritation.

3. The incidence of nickel rash might be greatly reduced by proper attention to ventilation and the maintenance of a suitable cooling power for the worker.

4. The cure of nickel rash can be hastened by the oral administration of calcium chloride, which counteracts the tendency toward alkalosis produced by excessive heat.

5. It is suggested that other occupational skin diseases may be produced by factors similar to those of importance in the etiology of nickel rash.

The authors wish to thank Dr. J. G. Cunningham, Director of the Division of Industrial Hygiene, Provincial Department of Health, and Prof. George Hunter, of the Department of Pathological Chemistry, University of Toronto, for valuable criticism and suggestions. Special acknowledgment is made to Mr. D. Lowe and Mr. F. Chalmers of the International Nickel Company, Port Colborne, for assistance.

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THE COLORIMETRIC DETERMINATION OF MINUTE AMOUNTS OF NICKEL. POTASSIUM DI-THIO-OXALATE AS A SENSITIVE REAGENT*

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IN a recent study of the biologic effect of nickel ingestion (1) a method was reported for the estimation of nickel in the minute quantities that occur in biologic material. The need for such a method was apparent because of the difficulty otherwise of successfully tracing minute amounts of absorbed nickel in the body. It requires but a brief survey of the older methods of nickel analysis to realize how difficult the exact estimation of this metal was. Since Tschugaeff's discovery of di-methyl-glyoxime as a reagent for nickel (2), however, the analytic separation and estimation of this metal have been greatly facilitated. The use of this reagent as well as other oximes (notably α-benzyl-dioxime) affords a cleaner, more rapid, and more accurate method of estimation of the amounts ordinarily encountered in nickel analyses than was possible by the older methods. It is not surprising, therefore, that attempts should have been made to apply this method to the estimation of very small amounts of nickel. Shortly after Tschugaeff's method of analysis was published, Armit and Harden (3) developed a colorimetric method involving the use of di-methyl-glyoxime for the estimation of minute amounts of nickel. Armit's procedure is as follows: Measured amounts of a solution containing nickel are treated with 0.5 c.c. of a 10 per cent. solution of ammonium hydroxide and the same amount of an alcoholic solution of di-methyl-glyoxime. The solution is then diluted to 30 c.c. The amount of nickel may be estimated by comparing the solution in a Nessler tube against similarly prepared solutions containing standard amounts of nickel. Armit claims an accuracy of 0.7 per cent. in the determination of 0.07 mg. of nickel. He gives very few data in support of this and determinations similarly made in this laboratory were disappointing.

The failure of Armit's method to give better than a roughly quantitative measure of small amounts of nickel was found to be due to the fact that nickel salts in dilute solution do not give a true color to the liquid in the presence of di-methyl-glyoxime. No color is apparent on the first addition of the reagents; there is a definite reaction interval or lag before the pink "tint" appears. Investigation showed that there is no true color to the solution itself; the color is due instead to crystalline particles of the nickel oxime. If such a solution be filtered,

* Received for publication Aug. 9, 1926.

the filtrate is colorless, while pink crystals are collected on the filter paper. It is therefore a turbidimetric rather than a colorimetric method of estimating nickel. It was found to be impossible to secure satisfactory check analyses when using this method under different conditions of salt concentration in order to simulate actual analytic conditions. This is not surprising in view of the fact that the test depends upon the separation of a solid, minute in amount, and hence very sensitive to salt concentration. The nickel oxime is at first highly dispersed, the particles becoming larger and larger depending upon such factors as the amount of nickel, the length of time the solution stands, and the total salt concentration. As is well known, salts of various metals have the property of precipitating colloids at rates dependent upon the valences of the metals and upon the total salt concentration. In these dilute solutions the nickel oxime must be highly dispersed when first formed and the salts present probably decrease the degree of dispersion to a varying extent. It is not surprising then that variable results are secured, for the success of any turbidimetric method depends upon uniformity of particle size.

For the detection and estimation of very small amounts of certain metals a colorimetric method is often not only convenient, but frequently can be made to give results of an accuracy not approached by grosser methods. This is particularly true of nickel; while the analytic separation of the metal is not difficult, its final estimation in these small amounts has been particularly unsatisfactory. The red-dish brown color which develops with potassium thiocarbonate has been suggested as such a means of estimation. Thiel and Ohl (4), however, found that this reagent is not particularly sensitive (the limit of sensitivity was found to be 0.01 mg. of nickel), and further investigation in this laboratory proved the method to be unsuitable for other reasons.

During an investigation of the di-thio-oxalates in 1909, Jones and Tasker (5) isolated potassium di-thio-oxalate for the first time and discovered that this compound develops intense colors with a number of metallic salts. Among these they found that nickel salts in aqueous solution give a deep magenta color in dilute solution, while from concentrated solutions black crystals separate. These crystals color water more intensely in proportion than potassium permanganate.

An investigation of the reaction in this laboratory indicated that potassium di-thio-oxalate possesses several valuable assets as a reagent for nickel. In the first place the test is extremely sensitive; in the second place the color is sufficiently permanent to allow all the necessary latitude in making measurements of its intensity; and finally the color develops in neutral or acid solution. The latter is a very valuable feature, as it avoids the necessity of removing calcium, magnesium, and phosphates—none of which interfere with the color. It is necessary to remove iron, which gives a deep purple color in small amount, and if cobalt is present, nickel must be separated from it by an alternate process before the final estimation is made. Manganese is a factor when present in large

amount (15 mg. in a 50-c.c. Nessler tube barely develops a visible color), but it is not present in large enough quantity to be of consequence in the analysis of biologic material for nickel. Certain other factors which influence the accuracy of the method will be discussed later on.

The Method of Analysis

The method of analyzing biologic substances for nickel as originally developed in this laboratory (1, p. 346) and slightly modified is given in full below:

1. Drying and Carbonizing

The material (tissues, excreta, foodstuffs, milk, etc.) must be dried, baked in an oven until charred, and then ashed, preferably in an electric muffle furnace. Transfer the material to a porcelain dish and heat to dryness on a hot plate or in an oven. When dry, increase the temperature so that the material is carbonized. Transfer the char to a small porcelain dish for ashing. Urine or milk should be boiled to dryness in a large porcelain dish on a hot plate. Vigorous boiling is to be avoided, and, in order to prevent bumping and spattering, add 10 c.c. of concentrated hydrochloric acid. Char the residue as above and transfer to a small porcelain dish.

2. Ashing

Transfer the dishes of carbonized material to the muffle furnace and heat at a low red heat. They should remain at this temperature no longer than half an hour as the salts (in the case of urine and certain foodstuffs) fuse and coat the carbon particles, preventing any further oxidation and making the subsequent extraction difficult. It is better to underheat the first time than to overheat. After the dishes have been removed and are cold, treat them with 15 c.c. of 1:1 hydrochloric acid, cover the residue with water, and heat to boiling, first covering the porcelain dishes with clock glasses. Filter and extract twice more with boiling water. Return the filter paper and residue to the porcelain dish, dry in a hot-air oven, and re-ash in the muffle furnace. When cold, extract as before. One more ignition and extraction will generally be necessary before everything goes into solution. There is usually a silicious residue from feces which may be discarded.

3. Removal of Heavy Metals

Neutralize the hydrochloric acid solution with pure ammonium hydroxide,[1] using methyl orange as an indicator. Then add a few drops of hydrochloric acid until the solution is just acid in reaction. Saturate the cold solution with hydrogen sulphide gas and allow it to stand a few hours or overnight if no precipitate forms at once. Filter and wash the residue with hydrogen sulphide water. Boil the filtrate till free from hydrogen sulphide and add bromine water in sufficient amount to oxidize the iron to the ferric state. The solution is then analyzed for nickel by one of the two following methods.

4. Estimation of Nickel

A. In the Absence of Cobalt

It is necessary to free the solution from iron only in order to estimate the nickel directly. Most biologic material contains iron in varying amounts, accompanied usually by a greater amount of phosphate. Ferric phosphate is insoluble in neutral or acetic acid solution, and the iron may be removed, therefore, by merely neutralizing the solution. This must be done carefully, however, in order to avoid precipitating calcium and magnesium phosphates. The best plan is to add a buffer salt such as ammonium acetate. The slightly acid solution containing ferric iron should be treated with 10 c.c. of 50 per cent. ammonium acetate solution and 0.5 c.c. of glacial acetic acid. All the free hydrochloric acid is neutralized by the ammonium acetate, and an equivalent amount of acetic acid is liberated. The acetic acid prevents the precipitation of calcium and magnesium phosphates. The solution *must be cold* before the ammonium acetate is added, other-

[1] Prepared by absorbing ammonia gas (NH_3) in cold distilled water.

wise part of the iron will be reduced and thus escape precipitation. Filter the cold solution through quantitative filter paper into a volumetric flask. The filtrate should be water-white with no trace of turbidity. The ferric phosphate is usually small in amount and is readily filtered out. Dilute the solution to an exactly known volume, say 500 c.c.

Nickel Reading.—Transfer 50 c.c. of this solution to a Nessler tube and add a small amount of potassium di-thio-oxalate. If nickel is present, a clear magenta color develops at once. If nickel is absent, no color is apparent except that the solution may be slightly yellowish from an excess of di-thio-oxalate. A brownish color indicates an excess of cobalt in solution; a purple shade shows that the iron has not been completely removed, and in this event it will be necessary to repeat the oxidation and precipitation with an aliquot part of the solution. This is very troublesome and it is far easier to insure complete oxidation of the iron at the earlier stage.

In order to determine the amount of nickel present, a series of nickel standards in Nessler tubes should be prepared, ranging from 0.005 to 0.05 mg. of nickel—*i.e.*, 0.005, 0.01, 0.02, 0.03, 0.04, 0.05 mg. The unknown solution should be matched against these. It is not advisable to use higher concentrations of the standard nickel solution with Nessler tubes, as the tint is too deep for satisfactory reading. For larger amounts of nickel, it is preferable to use a colorimeter of the Duboscq type.

B. In the Presence of Cobalt

In case cobalt is present in amount sufficient to interfere with the colorimetric test for nickel, separation of the nickel from the cobalt will be necessary before the test is applied. Iron, if present in the solution, may be prevented from precipitating at a later stage (as the hydroxide) by the addition at this point of sodium citrate. Add 10 c.c. of 20 per cent. sodium citrate solution. Then add ammonium oxalate solution very slowly, stirring constantly, so as to separate calcium oxalate in crystalline form in the acid solution. When precipitation ceases, add dilute ammonium hydroxide slowly in such a manner as to produce crystalline ammonium magnesium phosphate in the same solution without filtering out the calcium oxalate. After the calcium and magnesium are quantitatively precipitated, they should be filtered out, washed, re-dissolved in hydrochloric acid, and re-precipitated as before. The filtrate from this precipitation should be combined with the first filtrate. In this way any nickel that is mechanically carried down with or incompletely washed out of the first precipitate may be recovered. The alkaline filtrate, which is now free from calcium and magnesium, and partly free from phosphates (the latter are removed only as a means of eliminating magnesium), is treated with an excess of α-benzyl-dioxime, filtered, the residue dissolved in acid—aqua regia is preferable—and the acid solution evaporated to dryness in a porcelain dish. Add 1 or 2 c.c. of concentrated hydrochloric acid and again evaporate to dryness in order to destroy any excess of nitric acid. Finally, dissolve the residue in a few drops of dilute hydrochloric acid, dilute to a convenient known volume, and determine the nickel content by the colorimetric method already outlined.

The second method is longer and more troublesome than the first, and fortunately need be utilized only in those cases where a noticeable amount of cobalt is present. The small amount of cobalt existing in nickel or nickel salts is insufficient to have any effect on the color which develops and, judging from the analyses obtained so far, it is only occasionally that cobalt is excreted in sufficient amount to interfere with the test.

Since the foregoing method was developed it has been found that different lots of potassium di-thio-oxalate vary somewhat in the rate at which the color of the compound changes in acid solution with amounts of nickel of less than 0.05 mg. The rate of change is not significant in solutions of low acidity, but in strongly acid solutions the color change is noticeable after an hour or more and the Nessler tube

readings are affected by a turbidity which develops. Apparently the method of preparation is partly at least responsible for this, as one lot in particular was but little affected by changes in acidity. The preparation of potassium di-thio-oxalate as described by Jones and Tasker (5, p. 1906) and as somewhat modified in this laboratory is, therefore, here briefly described.

Preparation of Potassium Di-Thio-Oxalate

Treat 2 gram-molecules of ethyl mercaptan with 1 gram-molecule of oxalyl chloride at room temperature, adding the oxalyl chloride in small amounts at a time. Hydrogen chloride is abundantly evolved. After action has apparently ceased, heat gently in order to drive off the remaining excess of hydrogen chloride and an excess of either of the reacting substances. Dissolve the resulting ethyl di-thio-oxalate in ethyl alcohol and add an equivalent of potassium hydrosulphide dissolved in alcohol. The latter should be prepared by treating an equivalent weight of potassium hydroxide in alcohol with hydrogen sulphide until the cold solution is saturated with hydrogen sulphide gas; it should be allowed to stand overnight and then be filtered from the residue of metallic sulphides. Pour the alcoholic potassium hydrosulphide solution into the solution of ethyl di-thio-oxalate, stirring vigorously, and allow to stand for about an hour. An abundant white crystalline precipitate of potassium di-thio-oxalate forms. Pour off the supernatant fluid, collect the crystals on a Büchner funnel, and wash well with cold alcohol. The crystals should be dried and stored in amber colored bottles. The salt will keep for several months but eventually becomes light coffee colored and gives the characteristic magenta color with nickel accompanied by a turbidity in acid solution which interferes with accurate readings.

Discussion of the Method

An examination of this colorimetric method has shown that nickel in amounts of 1 mg. can be determined with an average accuracy of 0.02 mg. To test this, a solution was made up of pure salts in imitation of the mineral content of milk. Exactly 1 mg. of nickel was added to portions of this salt solution, each of which corresponded in mineral content to 500 c.c. of milk. These solutions were then analyzed for nickel by the procedure previously outlined. In a series of ten experiments the maximum deviation was 0.05 mg. and the average error 0.02 mg.

Experiments in which the acidity of the solution was varied, using hydrochloric acid in one case and acetic acid in the other, showed that the determination of nickel in amounts of 0.1 mg. or more is not seriously affected by varying the acid concentration from 0.0001 molar to 1.0 molar. Estimations made of the nickel content of solutions of nickel in acid solutions of various strengths are summarized in Table 1. The depth of color of these solutions when treated with potassium di-thio-oxalate was compared with a standard of the same concentration in distilled water, using a Duboscq colorimeter for comparison. It is apparent from these results that readings of this amount of nickel can be made

with accuracy in solutions ranging from 0.0001 to 1.0 molar in acidity.

In the method of analysis as previously outlined, the degree of acidity of the final solution which is used for the nickel reading will be no more than 0.02 molar. When the amounts of nickel are less than 0.05 mg., the acidity should be adjusted, however, so that the solution is no more than 0.01 molar with respect to acid. With amounts of nickel of 0.01 mg. or less and an acidity greater than 0.01 molar, the color developed is tinged with yellowish brown instead of clear pink, making comparison with the standards difficult. With a quantity as minute as this, however, it is still possible to make a color comparison with the standards by adjusting the latter to the same degree of acidity as the unknown solutions.

TABLE 1.—EFFECT OF ACID CONCENTRATION ON NICKEL ESTIMATION

AMOUNT OF NICKEL	ACID CONCENTRATION (MOLAR)	HYDROCHLORIC ACID	ACETIC ACID
mg.			
0.1	1.0	0.098	0.097
0.1	0.1	0.099	0.101
0.1	0.01	0.094	0.101
0.1	0.001	0.098	0.098
0.1	0.0001	0.098	0.097

Conclusions

Potassium di-thio-oxalate as a reagent for the colorimetric determination of nickel possesses many advantages over existing methods. It not only is more sensitive than any other colorimetric method for nickel analysis, but also permits the accurate estimation of small fractions of a milligram.

The method of analysis is described in detail and the effects of differences in acid concentration are discussed.

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HANDBOOK OF SAFETY AND ACCIDENT PREVENTION. By *Fred G. Lange*. Flexible leather. Pp. 512 with illustrations, supplement, and index. New York: The Engineering Magazine Co., 1926.

This really excellent work aims to provide a handbook for the beginner as well as for the experienced man in safety engineering. It traces the development of safety work and accident prevention coincidentally with the beginning and growth of the factory system. It takes the beginner in safety engineering through the various steps in the organization of the safety department and its very close relationship with the work in personnel administration. Methods of investigating accidents from the point of view both of administration and of research are considered in great detail. There is an elaborate discussion of the various guards in use in most of the trades, as well as a discussion of the safety rules in these same trades. Practically all types of safety work including even public and school safety are considered. The relation of medical service to safety work is discussed and the various industrial hazards are enumerated.

The author has carefully correlated these existing factory safety rules and regulations with various state regulations and with the existing national codes, and has reenforced this with copious references to statistical data collected all over the country both from private industrial organizations and from national bureaus.

All together, there is a large amount of material affording detailed information for the safety man who wishes to use this volume as a handbook for reference purposes.—*D. C. Parmenter.*

ADVISING THE TUBERCULOUS ABOUT EMPLOYMENT. By *W. I. Hamilton*, Personnel Director, Boomer-Dupont Properties Corp., New York. Formerly Director Research Bureau, American Hotel Association; Chief of Rehabilitation, Federal Board of Vocational Education, Washington, D. C.; Agent Massachusetts Board of Education; Lecturer, Harvard University Summer School, Northwestern University School of Business Administration: and *T. B. Kidner*, Institutional Consultant, Technical Adviser Central New England Sanatorium Assoc. Industrial Settlement. Late Institutional Secretary National Tuberculosis Assoc. Formerly Secretary Canadian Military Hospitals Commission; Special Adviser on Rehabilitation, Federal Board for Vocational Education, Washington; D. C. Cloth. Pp. vii, 171. Baltimore: The Williams & Wilkins Co., 1925.

This book treats of the problems which confront the doctor or the social worker in placing an arrested case of pulmonary tuberculosis at work. The problems of the patient with arrested tuberculosis, the proper advice which should be given him in his selection of employment, the particular hazards which he should avoid, and similar subjects are dealt with in a concise and detailed manner.

The authors consider that a doctor, social worker, or public health officer who advises a patient suffering from arrested tuberculosis in his choice of occupation has a distinct and difficult duty to perform. In order to advise successfully, the adviser must know

the exact details of the industrial work at which the patient is to be placed. These details require, in many cases, considerable investigation, and a knowledge of industrial poisons and of industrial hazards. The authors believe too much emphasis has been placed on the idea that arrested cases of tuberculosis should return to work at light jobs in the open air. They recognize that work of this type is hard to procure and that the pay is frequently inadequate to give the patient the nourishment he requires. They suggest that there are many occupations in a factory for which the patient is partially trained, because of his past experience, which are suitable for him provided he remains under medical supervision. They believe the patient should return to work as closely approximating that which he was doing prior to his illness as it is medically safe for him to do. They call attention to the co-operating agencies with which the adviser may work, giving these in detail, and suggesting methods of contact which may prove of great advantage to the patient. Special emphasis is laid on the value of the physician in industry, both in assisting in the placement of the returned tuberculous patient and in the subsequent checking up of his physical condition. The last chapter consists of a general bibliography of books and articles dealing with the subject discussed.

The industrial physician and the public health nurse will find this book a distinct aid in giving them a clear conception of the employment problem of the patient with arrested tuberculosis and of the way in which this problem may best be met. The book is to be commended for its clearness, its detail, and the broad lines along which it is written.—*W. Irving Clark.*

BOOKS RECEIVED

Books received are acknowledged in this column, and such acknowledgment must be regarded as a sufficient return for the courtesy of the sender. Selections will be made for review in the interest of our readers and as space permits.

GIRLS' CLUBS: THEIR ORGANIZATION AND MANAGEMENT. A MANUAL FOR LEADERS. By *Helen Ferris*. With an introduction by *Jane Deeter Rippin*. Cloth. New edition. Pp. ix, 319. New York: E. P. Dutton & Co., 1926.

A MANUAL OF NORMAL PHYSICAL SIGNS. By *Wyndham B. Blanton*, B.A., M.A., M.D., Richmond, Virginia, Associate in Medicine, Medical College of Virginia. Cloth. Pp. 215 with index. St. Louis: The C. V. Mosby Co., 1926.

MENTAL ABNORMALITY AND DEFICIENCY. AN INTRODUCTION TO THE STUDY OF PROBLEMS OF MENTAL HEALTH. By *Sidney L. Pressey*, Ph.D., Assistant Professor of Psychology in the Ohio State University, and *Luella Cole Pressey*, Ph.D., Instructor in Psychology in the Ohio State University. Cloth. Pp. xii, 356 with appendices, bibliography, glossary, and index. New York: The Macmillan Co., 1926.

HAY-FEVER AND ASTHMA. A PRACTICAL HANDBOOK FOR HAY-FEVER AND ASTHMA PATIENTS. By *Ray M. Balyeat*, A.M., M.D., Instructor in Medicine in the University of Oklahoma Medical School; Consulting Physician to St. Anthony Hospital and to the State University Hospital; Director of the Oklahoma Asthma and Hay-Fever Clinic, Oklahoma City; Member of the American Association for the Study of Allergy. Cloth. Pp. 198 with illustrations and index. Philadelphia: F. A. Davis Co., 1926.

THE NATIONAL GOVERNMENT AND PUBLIC HEALTH. By *James A. Tobey*, M.S., LL.B., Fellow, A.P.H.A. The Institute for Government Research, Studies in Administration. Cloth. Pp. xviii, 423 with appendix and index. Baltimore: The Johns Hopkins Press, 1926.

ELECTROTHERMIC METHODS (DESICCATION AND COAGULATION) IN THE TREATMENT OF NEOPLASTIC DISEASES. DESIGNED AS A PRACTICAL HANDBOOK OF SURGICAL ELECTROTHERAPY FOR THE USE OF PRACTITIONERS AND STUDENTS. By *J. Douglas Morgan*, B.A., M.D., Formerly Radiologist, Ross Pavilion, Royal Victoria Hospital, Montreal; Instructor in Radiology, University of Pennsylvania Graduate School of Medicine, Philadelphia, Pa.; Assistant Radiologist, Philadelphia General Hospital; Member of the Roentgen Society, London, England; Member of the British Institute of Radiology; Fellow of the Royal Society of Medicine, London, England; Member of the American Roentgen Ray Society; Member of the American Radium Society; Fellow of the American Academy of Physiotherapy, etc. Cloth. Pp. 172 with illustrations, bibliography, and index. Philadelphia: F. A. Davis Co., 1926.

SUBJECT INDEX TO VOLUME VIII

This is a subject index to all the reading matter in the JOURNAL OF INDUSTRIAL HYGIENE, and one should, therefore, look for the subject word, with the following exception: "Book Notices" are indexed under this title on page 539. The name of the author follows the subject entry in parentheses.

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ABSTRACT OF THE LITERATURE

OF

INDUSTRIAL HYGIENE

SUPPLEMENTARY TO

THE JOURNAL OF INDUSTRIAL HYGIENE

EDITORS

DAVID L. EDSALL, M. D., S. D., United States
EDGAR L. COLLIS, M. D., M. R. C. S., Great Britain

VOLUME VIII
JANUARY, 1926—DECEMBER, 1926

PUBLISHED BY
HARVARD SCHOOL OF PUBLIC HEALTH
Boston, Mass.

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ABSTRACT OF THE LITERATURE OF INDUSTRIAL HYGIENE

VOLUME VIII JANUARY, 1926 NUMBER 1

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GENERAL

BULLETIN OF HYGIENE OF THE TROPICAL DISEASES BUREAU.

The Tropical Diseases Bureau in London has been publishing three Sanitation Supplements every year in connection with its Bulletin. The announcement is now made that these supplements will be replaced, from Jan. 1, 1926, by a monthly Bulletin of Hygiene, which will review the literature of public health and preventive medicine. The new bulletin will contain a section devoted to industrial hygiene.—E. L. C.

GENERAL PRINCIPLES FOR THE INSPECTION OF THE CONDITIONS OF WORK OF SEAMEN. *Second Item on the Agenda of the Ninth Session of the International Labour Conference, 1926. (Questionnaire II.) Internat. Labour Office, 1925, pp. 55.*

INDUSTRIAL DISEASES IN ONTARIO. *A. R. Riddell. Canadian Med. Assn. Jour., May, 1925, vol. 15, p. 510.*

HEALTH OF THE WORKERS. *L. I. Dublin. U. S. Month. Labor Rev., Jan., 1925, vol. 20, pp. 8–14.*

The author states that "the industrial workers of the country, taken by and large, may be distinguished by a marked diminution in their longevity from those who are engaged in other forms of employment, such as agriculture, the commercial and professional pursuits, etc." He estimates that at the present time the expectation of life of men engaged in industrial pursuits at age 20 is forty-two years, whereas those who are not engaged in industry may expect an additional fifty years at age 20. There is, therefore, a difference of about eight years in the average expectation of the two groups.

Among the factors responsible for this reduction in life expectancy of industrial workers he mentions accidents (responsible for a decrease of about one year), tuberculosis (responsible for a loss of between eighteen months and two years), pneumonia, and the degenerative diseases, such as cerebral hemorrhage, Bright's disease, and organic heart disease. The remedial measures which he suggests are made with a particular view to meeting the conditions in New York State. They include education of the medical profession, education of the workers, enlisting the co-operation of employers, and the establishment of industrial clinics in connection with the large general hospitals. By way of illustrating what can be done through industrial clinics, the author cites the experience of the Industrial Clinic of the Massachusetts General Hospital. —M. C. S.

POISONOUS HAZARDS AND THEIR EFFECTS: GASES, CHEMICALS, ETC.

THE PHYSICIAN IN HIS RELATIONSHIP TO INDUSTRIAL TOXICATION. *V. E. Henderson. Canadian Med. Assn. Jour., April, 1925, vol. 15, p. 390.*

MORBID ANATOMY OF CHRONIC POISONING FROM CARBON BISULPHIDE. *P. Redaelli. Boll. d. Soc. med.-chir. di Pavia, 1925, vol. 37, p. 133.*

EXPERIMENTAL INVESTIGATIONS ON POISONING WITH CARBON BISULPHIDE. *M. Arezzi. Ibid., p. 141.*

Abstracted as follows in Med. Science, Sept., 1925, vol. 12, p. 515.

Redaelli discusses the lesions observed in a case of chronic poisoning from carbon bisulphide probably due to inhalation of vapors during work by a particularly susceptible subject. Important changes were found only in the stomach and kidneys. In the former the mucous membrane was beset with many necrotic foci associated with congestion and hemorrhages, while in the latter the picture of a subacute parenchymatous nephritis was observed.

Arezzi describes the results of some experimental investigations carried out in guinea-pigs, rabbits, and cats, which were poisoned either by introducing into their stomach small quantities

of carbon bisulphide, or by keeping them in an atmosphere surcharged with vapors of the same substance. The poisoning through the gastric route gave rise to a hemorrhagic gastritis and to an intense congestion with some small hemorrhages in the lungs, kidneys, liver, and spleen. In the animal poisoned by inhalation the same changes were noticed, but complicated by the occurrence of a parenchymatous nephritis similar to that observed by Redaelli in the case mentioned above.

DANGERS OF AND TREATMENT FOR CARBON MONOXID POISONING. *R. R. Sayers and W. P. Yant. Abstr. as follows from Military Surgeon, July, 1925, vol. 57, p. 64, in Jour. Am. Med. Assn., Aug. 22, 1925, vol. 85, p. 637.*

Sayers and Yant emphasize that inhalations, for a period of from twenty to thirty minutes, of oxygen or a 5 per cent. mixture of carbon dioxide in oxygen, if available, will, when given immediately, greatly lessen the number and severity of symptoms of carbon monoxide poisoning, as well as decrease the possibility of serious sequelae. All industries in which this type of poisoning commonly exists should provide apparatus (inhalers) for the efficient administration of these treatments. This apparatus should be placed at points most convenient for treating carbon monoxide poisoning and employees should be trained in its use so that resuscitation may be effected immediately.—K. R. D.

EARLY BED-SORES AS A DIAGNOSTIC SIGN OF CARBON MONOXID POISONING. *M. A. Rabinowitz. Abstr. as follows from Am. Jour. Med. Sciences, July, 1925, vol. 170, p. 98, in Jour. Am. Med. Assn., Sept. 5, 1925, vol. 85, p. 771.*

The very early appearance of bed sores in a previously comatous or still stuporous individual, in Rabinowitz' opinion, is almost pathognomonic of carbon monoxide poisoning, and is not found as early in other conditions. This sign is therefore of great value from a clinical and medicolegal viewpoint.—K. R. D.

SAVING THE SURFACE AND THE SPRAY-GUN PAINTER. *C. T. Fish. Nat. Safety News, April, 1925, vol. 11, pp. 18, 40.*

"The first essential for safety in spray painting is a properly designed air brush. Gorge points and restricted orifices require high air pressure to force the paint through the gun with resulting overatomization and excessive fumes. The next essential, where small articles are to be painted, is a properly designed spray booth with adequate exhaust." If these ideal conditions do not prevail, a gas mask is necessary. In spray painting interior walls, where the fumes cannot be removed by forced ventilation, gas masks should also be used. Reference is made to Sharpe's article on this subject in which the conclusion reached was that it is not possible for workmen to get enough air through a really effective mask with any degree of comfort (see THIS JOUR., 1921–1922, vol. 3, p. 378). There is greater hazard from the inhalation of fumes of volatile substances, such as turpentine, benzine, and benzol, than in any other kind of painting.

The regulations adopted by the Industrial Commission of Wisconsin urge that all spray-gun operators and

helpers receive a physical examination before employment, whenever incapacitated for any reason, and at periods not exceeding three months. They also require that during operation the nozzle of the spray gun must not be more than 13 inches from the surface being coated and that the paint pressure must not exceed that necessary to produce a free flow of paint, must not spurt, when the gun is operated independently of operating pressure. In pressure systems this is approximately 1 pound for each foot of elevation of the gun above the surface of the paint supply. In addition to protection for the nose and mouth, the regulations prescribe that the head shall be covered with a low-fitting cap with visor, the body shall be covered with clothing as close fitting as possible, paying particular attention to the fit at the neck and wrists, and the hands shall be protected by suitable gloves. Exposed parts of the body are protected by anointing them with a nondrying oil, grease, or cream.—M. C. S.

Unusual Case of Acute Lead Poisoning. *F. W. Luney. Canadian Med. Assn. Jour., June, 1925, vol. 15, p. 639.*

Cholesteremia in Lead Poisoning. *A. Ceresoli. Abstr. as follows from Clin. Med. Ital., Oct., 1924, vol. 55, p. 99, in Jour. Am. Med. Assn., Sept. 19, 1925, vol. 85, p. 934.*

Ceresoli concludes from his experiments on dogs and clinical research that the cholesterol varies with the functional capacity of the liver, the organism behaving in this respect in lead poisoning the same as in infectious diseases.—K. R. D.

Specific Action of Lead on Chorion Epithelium of Rabbit, Contrasted with Action of Copper, Thallium and Thorium. *W. B. Bell, R. A. Hendry, and H. E. Annett. Jour. Obst. and Gynec. Brit. Emp., 1925, vol. 32, p. 1.*

Pharmacology of Cadmium. *M. Kochmann and C. Grouven. Deutsch. med. Wchnschr., March 13, 1925, vol. 51, p. 427.*

Phosphorus Poisoning in Match Factories in China. (Report to the Industrial Committee of the National Christian Council of China.) *C. T. Maitland. Abstr. as follows from China Jour. Science and Arts, Feb., March, 1925, vol. 3, pp. 20, in Trop. Dis. Bull., Sanitation Supplement, July, 1925, pp. 145–146.*

The methods adopted in the inquiry were: (1) correspondence with physicians and others likely to be in possession of the facts in all known centers of match manufacture; (2) personal investigation in Shanghai, Pekin, Tientsin, Chefoo, and Tsingtao.

From the first source of information replies were received dealing with twenty-eight cities representing 120 match factories. Of this number twenty-five factories used white phosphorus, nineteen red phosphorus, four both the white and the red; from the rest no detail as to the kind of phosphorus used was given.

The conclusions arrived at are as follows:

1. There is evidence of the occurrence of cases of phosphorus necrosis of the jaw among match workers in China. For reasons that are not clear, it appears that the number of

cases is relatively few compared with Western experience.

2. There are grounds for belief that match manufacturers of China intend to discontinue the use of white phosphorus at the end of 1924 in pursuance of the prohibition of the Pekin government.

3. In the writer's judgment, the general conditions of labor in match factories have worked far more ill to the health of workers than poisoning by white phosphorus.

A description is given of four dangerous processes:

Mixing.—This takes place in ill-ventilated workplaces, and practically no effort is made to prevent the inhalation of phosphorus vapor by the workers.

Dipping.—No attention is given to ventilation, and in consequence the vapor is inhaled during the necessary process of spreading the phosphorus paste preparatory to dipping the match sticks.

Drying.—In certain cases the drying rooms, which are very hot and in which the atmosphere smells strongly of phosphorus, communicate with places in which other work is progressing without other means of ventilation.

Boxing.—The filling is done by hand, with the result that they smell strongly of phosphorus after a period of work, and it is probable that an appreciable quantity of poison is ingested in eating with unwashed hands. The smell of phosphorus fills the air of the workroom for two reasons. This is partly because the dried matches still continue to give off vapor, and chiefly due to the accidental firing of matches by friction. This latter disengages heavy fumes of the oxides of phosphorus, with which the whole atmosphere of the room may be hazy.

In the boxing departments child labor is common, many children of from 5 to 6 years of age being employed; they fill the boxes by hand with remarkable speed. E. L. C.

EXPERIMENTAL INVESTIGATIONS ON CHRONIC POISONING WITH PHOSPHORUS. *P. Mariconda. Abstr. as follows from Arch. farm. sper., 1925, vol. 39, p. 24, in Med. Science, Aug., 1925, vol. 12, p. 404.*

Experiments were made in rabbits and guinea-pigs to which small doses of phosphorus dissolved in oil were administered for long periods either *per os* or subcutaneously. The animals became very thin, but did not show any degenerative lesion of their internal organs and bones. When the animals were pregnant, abortion took place owing to intra-uterine hemorrhages. In a few cases the young were born, but they were smaller than normally, very weak, and died after a short time. It is not understood why chronic poisoning with phosphorus should not give rise in animals to any of the changes repeatedly observed in man.

PERNICIOUS ANEMIA DUE TO RADIUM. *M. Brulé and R. Boulin. Bull. et mém. Soc. méd. d. hôp. de Paris, March 27, 1925, vol. 49, p. 528.*

CONCERNING NEW ORGANIC TANNING MATERIALS. *Witt. Zentralbl. f. Gewerbehyg., Sept., 1924, N. S. vol. 1, pp. 50–52.*

Until recently the leather industry used for tanning purposes products

derived from plants or oils or alum together with sodium chloride or other mineral salts. But lately organic chemicals have come into use among which are the English products Synan D and DM which contain aldehydes, hydrocarbons, naphthols, phenols, and similar substances. Under the best of conditions tanneries are more or less disagreeable and harmful to the community and to the workmen. With the use of the new materials the usual precautions are necessary to prevent bad odors from putrefaction and fermentation. The only ill effects on the workmen in the use of the new organic materials are very slight skin irritations which result from continued work. It seems to the author that greater harm is done in handling the lime than in working with the Synans and similar products. In recent years some complaints have been made of harmful effects of the sweatbands made from the leather tanned with the new chemicals. In every case it has been proved that the bands were made of substitutes. Genuine leather treated with the new chemicals has no ill effect on health.—A. C. P.

DUST HAZARDS AND THEIR EFFECTS

THE INORGANIC DUST OF THE AIR IN INDUSTRIAL OPERATIONS AND ITS GRAVIMETRIC ESTIMATION. *V. Froboese. Arch. f. Hyg., 1925, vol. 95, pp. 174–187.*

Inorganic dust was determined by drawing the air through a paper filter and determining the increase in weight of the filter. Where analyses of the various constituents of the dust were desired, the filter papers were ignited and the ash analyzed.

In general, samples were taken at mouth level. Much emphasis is laid on the desirability of sampling over long periods of time—at least one hour—in order to obtain representative amounts. The suction pump used permitted a rate of sampling of 2 cubic meters per hour.

Results obtained in various rooms of a factory manufacturing porcelain and in an iron foundry are given.—P. D.

OCCUPATIONAL INFECTIOUS DISEASES: OCCURRENCE, TREATMENT, AND PREVENTION

PHTHISIS AND INDUSTRIALISM (NATIONAL AND OCCUPATIONAL) WITH REFERENCE TO OTHER INFECTIOUS DISEASES. (The Harben Lectures, 1924: Lectures I and II.) *E. L. Collis. Jour. State Med., March, 1925, vol. 33, pp. 101–144; April, 1925, vol. 33, pp. 151–187.*

THE AGE DISTRIBUTION OF INFECTIOUS DISEASES WITH SPECIAL REFERENCE TO SCARLET FEVER. (The Harben Lectures, 1924: Lecture III.) *E. L. Collis. Jour. State Med., May, 1925, vol. 33, pp. 201–229.*

These lectures begin with a quotation from "Einstein the Searcher" by Alexander Moszkowski, 1921, pointing out that sudden changes in

the conditions of existence even when in the form of a higher development might annihilate us, just as Indians succumb to civilization, and that the tragedy of our own highly civilized times is that we cannot create the social organizations that have become necessary as a consequence of the technical advances of the last century. This situation has given rise to crises, impasses, and senseless competition between nations and to the impoverishment of defenseless individuals, and among the conclusions (p. 227) is found the statement: "there is late life, when, owing to little understood stresses and strains of modern civilisation, a number, ever increasing as life extends, of partially resistant persons breaks down before the natural span is reached."

This sort of statement is so prevalent among a great variety of thinkers, and of the thoughtless, that one might be tempted to believe that it is a sort of deeply ingrained shibboleth of the human race and doubtless represents a point of view which has been expressed since very early times. Just what it means is difficult to say. Does it merely express that we are still subject to the laws of natural selection? If so, it would hardly seem that the statement were of very great importance except to those persons who consider that by virtue of our extraordinary mentality we should be able to withdraw ourselves from competition with our environment instead of merely shifting the point of urgency of the competition. Or does it mean that we are losing out in this competition with our environment; and that as compared with former times and owing to little understood stresses and strains of modern civilization people are more and more breaking down before the natural span of life is reached? It is somewhat difficult to define the natural span. Statistics are not available over the very long period of our civilization which, granted that a suitable definition had been adopted, would determine whether we are more and more breaking down before reaching the natural span of life. Of course we are all going to break down sometime and if through improved hygienic conditions or for any other reasons more of us that are born live to be 50, more of us must die after that age, which, taken as a whole does not seem to imply any great tragedy. Is it perhaps not better to die in considerable numbers at 75 than at 45, and does this mean that the natural span of life is being shortened? There is a qualitative statistical statement as to the span of life that has high authority and great antiquity to the effect that the natural span is three score years and ten and may be extended in the case of particularly rugged individuals to four score years. It may perhaps be doubted whether that statement, whatever it might precisely have meant when made, was not likely to be an overestimate in those days, and is perhaps an underestimate today. When one compares the curves showing the number of deaths in each year out of a cohort of 100,000 born alive, for different populations, one finds that this modal age at death among the white population of the so-called civilized countries tends to lie between 70 and 80 years. Does the biblical statement imply that the mode of this curve was in those days in that decade of life? It is noteworthy that for

negroes in the original registration states in this country the mode comes about ten years earlier. Are we to understand that this is a racial difference or that negroes are more subject to the stresses and strains of intense civilization than the whites? The curve for a country like India, which has certainly a very different sort of industrialization and intensity of civilization than England or the United States, shows its mode between 35 and 40 years, that is, at about one-half the age that we find for the whites in intensely competitive and highly civilized countries. Like every general statistical problem this one is exceedingly mixed. It is necessary to have generally accepted and precise definitions and reasonably good statistics to which to apply definitions before the statements really mean anything very much. We find persons who dwell on the distress of the poor in our cities and who, comparing their meager existence with the opportunities for life of the modern Croesus, and comparing an income that barely sustains the life with an income of a million dollars, point out such glittering conclusions as that the poor are getting poorer under the stress of civilization and the rich are getting richer, and that therefore there is a tremendous and increasing amount of social injustice. Here again we have a large number of terms that are not defined and the statement which probably has an ancient history comparable with the length of civilization itself. Whether the poor in our cities, bad as is their lot, are materially worse off than the poor in the feudal period of the Middle Ages or the poor in the ancient Egyptian civilization may be doubted, and whether the poor in New York City or London are worse than the poor in India or China today may also be doubted. It may be a good rule of social health as of individual health to be optimistic and to have confidence that things are on the whole not steadily getting worse, and whether this is or is not a good rule of health it is a thesis that through the general sweep of history seems as easy to sustain as the contrary thesis from the examination of a limited amount of statistical material covering a limited period.

So much emphasis, however, on the initial quotation and one of the final conclusions is really not justifiable. The main thesis of the lectures is that phthisis mortality in early adult mortality is an expression of resistance lowered by malnutrition; whereas phthisis mortality in the late middle life is an expression of resistance lowered by wear and tear. Dr. Collis supports these contentions by an elaborate and varied array of statistics and charts dealing for the main with the age specific death rates from tuberculosis at different periods and in different countries and for the two sexes. For example, there are the curves for Sweden showing the contrasting conditions with respect to the age and sex specific death rate from phthisis for the period 1776 to 1880 and for the year 1915. In the earlier period the death rate resembled greatly the curve for the death rate from all causes, descending from early life to about 10 years of age and ascending to a peak at 65 (but then falling off in older life as the curve for all causes does not); whereas in the recent period the descent to the age of about 10

years is still apparent but the peak is between 20 and 30 years, and the curve thereafter falls off gradually except for a slight rise for males around 60 years of age. The conclusions drawn by the author are that the struggle for existence in Sweden for both sexes 130 years ago was particularly severe, even though the food supply was apparently adequate, and that since then life has become far less strenuous but that the changes usually associated with industrial development combined with juvenile employment of both sexes have made the food supply comparatively inadequate. Unfortunately, no figures with respect to the food supply are offered either in connection with the figures for Sweden or apparently in connection with any figures. How far back one can get fairly good figures as to the food supply it is difficult to say. With respect to the qualitative elements of nutrition it might be difficult to have any figures at all, but certainly with respect to the quantitative figures giving the calorie consumption per head of population it should be possible to obtain some figures that might serve to support the author's contentions. At any rate, it seems as though if this question of food supply and its relation to mortality from phthisis in early ages were of great importance in the mind of the author he should at least have given us some direct supporting data from food statistics instead of trusting to the interpretation of a multiplicity of curves without such support. Once a statistical analysis has advanced far enough to be suggestive of a specific causative factor, it is ordinarily better procedure to attack that factor itself and study its relation to the statistics than to multiply incidences of the general sort which have led to the suggestion of that factor as important. It may be that Dr. Collis could not find such evidences as he needed bearing on the correlation of the food supply with the death rates from tuberculosis.

Curves are given for Australia, for Victoria, Australia, for Prussia, for New York City, and for Massachusetts. It is interesting to note that in 1868 the highest death rate from tuberculosis among males or females in New York City was at the age of 75 although both curves do show a hump in the ages around 30. For females this early hump tends to move to still earlier ages and the death rate at late ages becomes small. For males, on the contrary, the earlier hump tends to move to later life as time goes on, but with the same collapse of the extremely high figures in very late life. A long discussion with considerable quotation is given of the results obtained by Dr. Louis Dublin from the figures of the people insured in the industrial department of the Metropolitan Life Insurance Company and the different race stocks in America are separately discussed. It would appear that Dr. Collis in the main supports the conclusions of Dr. Dublin and incorporates them with his own. Czechoslovakia, The Netherlands, Denmark, and Japan, are also treated, as well as Ireland, Scotland, England and Wales. There is further segregation of urban and rural population in England and Wales.

The author then passes to occupational records in order to discuss them with respect to these two hypotheses of malnutrition as accounting for high

early mortality from phthisis and wear and tear for the high late mortality. The occupations with later mortality are mainly those in the food group in which are included farmers and agricultural laborers. As the rural population had shown high early mortality and low late mortality as compared with the urban group, it is necessary to explain away the apparent contradiction. Whether the explanations are adequate it is difficult to say. It would seem as though further analysis were necessary with an appeal to the method of partial correlation or to actual analysis of the food consumption of the agricultural communities as compared to that of the urban communities. There is a special treatment of dust cases, a subject with which the author has dealt much and on which he is regarded as an authority.

The third lecture departs from tuberculosis and examines the infectious diseases with special reference to scarlet fever. The underlying motive of this examination seems to lie in the hypothesis that alterations in the age incidence of mortality from the disease may be somehow connected with a general epidemiological cycle of the disease, with the further possibility that if such a relationship can be established one might be able to read back from the known alteration in the age distribution of the death rate from tuberculosis to some broad conclusions with respect to epidemic waves of this disease, the period of the waves being too long to be revealed by direct appeal to statistical material. The general conclusion is negative to the effect that there is no definite evidence of a relationship between age incidence and epidemiological waves, and that arguing from analogy there is no support so far as the current investigation goes for the possibility of a move in the age incidence of phthisis being a phenomenon associated with the fall in a long periodic wave. The author does not overlook the possibility that the changes in the age incidence of mortality may be due to variations in the capacity of the infectious diseases to attack at any given period of life or in any special circumstances; but he tends rather to explain the differences by altered powers of resistance to attack rather than to alterations in the potency or virulence of the attacking organism.

The author's final conclusion is that one result of this research is to demonstrate how premature mortality has resulted from faults in the social organization and how it has been reduced as the faults, by chance rather than by intention, have been somewhat corrected. He says that the art of governance is to rectify such faults, that the study of vital statistics brings them to light and is far too little heeded now that it is available. It is perhaps too much to hope that for a good while yet the governing bodies of our great democracies will pay much heed to the lights thrown upon faults in a social organization by studies in vital statistics. It is particularly difficult to avoid erroneous conclusions in an argument based wholly on statistics. The multiplicity of statistical material is so great that a person who formulates a reasonable hypothesis may not have too great difficulty in assembling a statistical proof thereof. Practical men have been so much imposed upon by perfectly well-meaning statisticians

that until the statistical evidence becomes very strong indeed they are apt to put it rather lightly to one side, and one who has on his shoulders the heavy burdens of conducting a government might well hesitate on the basis of any evidence submitted in these three lectures to take any legislative action for the betterment of social faults; he would probably do well to demand that as the two hypotheses relate to food and to wear and tear, the statistical investigations should not conclude until some independent study of the food had been made and some even rough definition of wear and tear and study of that phenomenon had been undertaken.

That some of the conclusions may appear somewhat overdrawn should not distract the attention from the great amount of valuable statistical analysis which the author has given in these lectures. It is the tradition of the Lectures that they should deal with worth while unpublished research and the series of 1924 lives up to the tradition.—E. B. W.

Origin of Cholera Epidemics in Jheria Coal-Fields. *G. C. Maitra. Indian Med. Gaz., March, 1925, vol. 60, p. 97.*

OCCUPATIONAL AFFECTIONS OF THE SKIN AND SPECIAL SENSES

Dermatitis from Telephone and Radio Earpieces. *R. O. Stein. Wien. klin. Wchnschr., March 12, 1925, vol. 38, p. 304.*

"Bird's Eye" Skin Affection in Tanners. *R. Barthélemy. Paris méd., March 21, 1925, vol. 55, p. 270.*

Occupational Dermatoses. *M. Winkler. Schweiz. med. Wchnschr., April 2, 1925, vol. 55, p. 296.*

Occupational Eczema and Insurance Practice. *D. Pometta. Schweiz. med. Wchnschr., April 16, 1925, vol. 55, p. 333.*

Case of Deafness, with Loss of High Tones, (?) Congenital. *T. H. Just. Proc. Roy. Soc. Med., March, 1925, vol. 18, pp. 13–14.*

The author presents the case of a man, aged 21, employed in an engineering tool shop, who has been troubled for a number of years with deafness and tinnitus which seem to be increasing of late. The patient cannot hear whistling or birds singing. He had scarlet fever when he was 6 years old, but gave no history of aural discharge.

In the discussion which followed the presentation of this case, the opinion was that this is a case of congenital deafness which has been rendered worse by the occupation.—M. C. S.

Some Injuries to Eyes of Native Mine Workers. *F. H. Napier. Med. Jour. So. Africa, Jan., 1925, vol. 20, p. 149.*

Injuries of Eyes of Native Mine Workers. *F. H. Napier. So. African Med. Rec., Feb. 14, 1925, vol. 23, p. 43.*

INTRAOCULAR STEEL INVASIONS OCCURRING IN TEN YEARS' PRACTICE. *F. Allport. Am. Jour. Ophth., June, 1925, vol. 8, pp. 472–483.*

The brief details of 223 cases of intra-ocular steel invasion are given, including the occupation of the patient, work engaged in when injured, form of magnet operation, and results. —M. C. S.

MINERS' NYSTAGMUS: ITS DIAGNOSIS AND ORIGIN. *A. F. Fergus. Proc. Roy. Soc. Med., Feb., 1925, vol. 18, pp. 17–22.*

It is Dr. Fergus' experience that there is practically always great impairment of visual acuteness in miners' nystagmus, and that this sign may, therefore, be of considerable help in the diagnosis of doubtful cases. He cites two cases which he considers of importance from this point of view. He suggests that the diminution in visual acuteness may be due to the fact that the rapid movements of the eyes prevent the proper stimulation of the maculae, or to some lesion at the pole of the occipital cortex involving the centers for visual acuteness. He bases the latter suggestion on the fact that there is almost always considerable pain at the back of the head. He states that it has sometimes occurred to him that the disease may be due to a definite and specific micro-organism, although the fact that many functions of the nervous system do not appear to be involved seems against this explanation. He urges further investigation of the disease.

An interesting discussion follows this paper.—M. C. S.

OCCURRENCE AND PREVENTION OF INDUSTRIAL ACCIDENTS

HERNIA AND OCCUPATIONAL ACCIDENTS. *E. Rey. Paris méd., April 25, 1925, vol. 55, p. 384.*

COAL-MINE FATALITIES IN NOVEMBER, 1924. *W. W. Adams. U. S. Bur. Mines, Rep. Investigations, Serial No. 2662.*

PRACTICAL SAFETY DEVICES FOR THE BOLT FACTORY. *A. L. Greene. Nat. Safety News, Feb., 1925, vol. 11, pp. 9–10.*

SAFETY DEVICES FOR WOOD-WORKING MACHINERY. GREAT BRITAIN AND SWITZERLAND. *Internat. Labour Office, Studies and Rep., Series F, Second Section (Safety) No. 2, 1925, pp. 80.*

PRECAUTIONS IN MECHANICAL REPAIR WORK. *Safe Practices Sheet No. 5, Nat. Safety News, April, 1925, vol. 11, p. 43.*

INDUSTRIAL ACCIDENTS IN NEW HAMPSHIRE, 1923–24. *U. S. Month. Labor Rev., April, 1925, vol. 20, pp. 881–882.*

In the fiscal year 1923 to 1924 there were nineteen fatal industrial accidents and 1,845 accidents causing disability for one week or over reported to the New Hampshire Bureau of Labor. The paper and pulp industry was responsible for the largest number of accidents, the cotton, worsted, and silk goods industry came next, then the lumber industry, the woolen goods

industry, and building and contracting.—M. C. S.

DIRECTIONS FOR THE TREATMENT OF RECOVERED POTASSIUM PERCHLORATE. GIVEN BY THE CENTRAL BOARD OF SURVEILLANCE FOR EXPLOSIVE AND MUNITION FACTORIES. *Zentralbl. f. Gewerbehyg., Sept., 1924, N. S. vol. 1, p. 49.*

The potassium perchlorate to be treated is not in pure form but contains about 4 per cent. of nitro compounds (dinitrobenzol and dinitronaphthalene and a little dinitrotoluol) and other impurities. As a result it is highly explosive. In order to minimize the danger during transportation a moisture content of 10 per cent. is prescribed by law. The removal of the moisture and impurities entails considerable danger to the workmen. Therefore a number of precautions are necessary. The milling, sifting, drying, etc., have to be carried out in separate, specially constructed buildings. If oil is used for lubricating the bearings of the machinery, special precautions are necessary to prevent its coming into contact with the perchlorate. Arrangements are made to flood all machinery in case of fire. Workmen are frequently given special instruction in regard to the hazardous nature of their work and they are required to wear special clothing which must be changed before their meals. Immediately outside the buildings water tanks are placed into which a workman may jump in case his clothing catches fire.—A. C. P.

INDUSTRIAL SURGERY

TREATING THE CAUSTIC BURN. *G. L. Coan. Nat. Safety News, Feb., 1925, vol. 11, p. 22.*

The points which the author brings out are:

1. Proper regard for protective measures prevents over 90 per cent. of burns—wearing rubber, canvas and cotton rather than leather or woolen goods, using goggles, gloves, and vaseline for exposed parts of the skin.

2. Instant first aid will nullify or reduce to a minimum the destructive action of the chemical.

3. If any blackened area appears on the skin, treatment should be carried out only under the direct supervision of a surgeon.

4. Every burn about the eye, however slight, should be referred to the plant surgeon or oculist immediately after an acid wash.—M. C. S.

STANDARD FIRST AID TREATMENT ADOPTED BY PHYSICIANS IN INDUSTRY. *Nation's Health, Aug., 1925, vol. 7, pp. 568–569.*

A recent revision of the standard methods for first aid in industry has been made by the Conference Board of Physicians in Industry, and adopted by the American Association of Industrial Physicians and Surgeons at its meeting at Atlantic City in May, 1925. The revised directions are published here.—E. S. C.

INDUSTRIAL PHYSIOLOGY: NUTRITION, METABOLISM, FATIGUE, ETC.

STUDIES ON THE RESPIRATORY ORGANS IN HEALTH AND DISEASE: XIX. THE SIGNIFICANCE OF SERIAL VITAL-CAPACITY READINGS IN THE GUIDANCE OF DIAGNOSIS AND TREATMENT OF CERTAIN DISEASES OF THE CHEST. *J. A. Myers. Am. Rev. Tuberc., March, 1925, vol. 11, pp. 64–70.*

Observations on several thousand persons have proved that theoretical normal vital-capacity standards are fairly satisfactorily worked out but, on account of individual variations like theoretical normal weight standards, they can never be highly satisfactory. The normal standards which have to date proved most satisfactory are those based on surface area of the body or standing height, the latter being less accurate.

Cases are cited to show that the vital-capacity test is of tremendous value both in diagnosis and the guidance of treatment when serial readings are made, and particularly when at least one of these readings was taken at a time when the patient was in good health.

The vital-capacity test is recommended strongly as a routine procedure in every physical examination.

THE STUDY OF FATIGUE. *C. S. Myers. Jour. Personnel Res., Jan., 1925, vol. 3, pp. 321–334.*

"Industrial fatigue is hard to measure. The typical laboratory tests fail to record a worker's real efficiency and recourse must be had to an analysis of curves of actual output, obtained under varying but carefully observed conditions. Thus, experiments on the introduction of twenty-minute rest pauses in a boot factory showed an average increased output of 44 per cent. These and other recent investigations of the Industrial Fatigue Research Board, as well as of the National Institute of Industrial Psychology, are admirably summarized and weighed by the author, who brings to his task a medical background as well as a rich experience of research in both the laboratory and the shop."

AN EXPERIMENTAL INVESTIGATION INTO REPETITIVE WORK. *I. Burnett. Indust. Fatigue Res. Board, Rep. No. 30, pp. 26. H. M. Stationery Office, 1925.*

Four girls out of employment who were the subjects of the laboratory investigation described were first submitted to intelligence tests; two ranked as very intelligent, one as average, and the fourth as below average. They were set to work at cross-stitching with a coarse silk thread on canvas with a wide mesh; they worked for two spells of three hours each day for four days a week. On Tuesdays unorganized rest pauses were allowed; on Wednesdays a quarter-hour pause was interpolated midmorning and midafternoon; on Thursdays there were no rest pauses and no talking; on Fridays three rest pauses of five minutes were distributed at equal intervals in both morning and afternoon spells. Six weeks were required to allow for practice effect; then three weeks on time wages were investigated; then came thirty weeks off, followed by one

week for practice effect which was now enough and five weeks on piece wages. The best and most consistent worker whose hourly output showed a relatively smooth curve was the one of average intelligence; those of greater intelligence could spurt but could not keep up the pace attained; the least intelligent improved most but never rivaled the others. The girls voluntarily competed against one another and this competition proved a means for alleviating monotony. Apparently highly intelligent persons are not suited to repetitive work. Work curves showing an initial spurt followed by low fall in the middle of the spell, with a second rise and another fall, are held to be indicative of monotony for light work of the kind investigated. Saddle-backed curves are considered to indicate fatigue. Payment by piece rates gave better results than by time rates; it diminished the monotony effect but increased the fatigue effect; it lessened variation about the average output; it stimulated competition, but rather discouraged the poorest worker; it gave a total average increase on time-rate output of 7.2 per cent. the first week, 18 per cent. the second, 20.2 per cent. the third, falling to 10.8 per cent. the fourth, and to 7.9 per cent. the fifth, when the investigation stopped. —E. L. C.

HEAT, COLD, AND HUMIDITY

THE KATA-THERMOMETER AS AN INDICATOR OF RADIANT HEAT. *H. M. Vernon. Jour. Nat. Inst. Indust. Psychol., Jan., 1925, vol. 2, pp. 198–202.*

After reviewing the fundamentals of the kata-thermometer Dr. Vernon describes his experiments in a tinplate factory in which the instrument was used as an indicator of radiant heat.

According to kata-thermometer indications, the new tinning process, known as the Melingriffith process (see THIS JOUR., 1925, vol. 7, pp. 171–183), is by far superior, from a health standpoint, to the usual tinning process because the atmospheric conditions prove to be much less trying to the operators than they are in the old methods.—C. P. Y.

WOMEN AND CHILDREN IN INDUSTRY

STATE LAWS AFFECTING WORKING WOMEN. *U. S. Dept. Labor, Women's Bur., Bull. No. 40, 1924, pp. 53.*

Charts and maps are given which show by states the legislation in effect July 1, 1924, regulating hours of work, minimum wage, and home work of women. Alabama, Florida, Iowa, and West Virginia are the only states in the United States which have no law governing the hours of work for women. About one-fourth of the states have laws either prohibiting or regulating home work. Thirteen

states have laws establishing a minimum wage for women workers.—M. C. S.

LIST OF REFERENCES ON MINIMUM WAGE FOR WOMEN IN THE UNITED STATES AND CANADA. *E. L. Stone. U. S. Dept. Labor, Women's Bur., Bull. No. 42, 1925, pp. 42.*

WOMEN IN OHIO INDUSTRIES. A STUDY OF HOURS AND WAGES. *U. S. Dept. Labor, Women's Bur., Bull. No. 44, 1925, pp. 137.*

FACTS ABOUT WORKING WOMEN. A GRAPHIC PRESENTATION BASED ON CENSUS STATISTICS AND STUDIES OF THE WOMEN'S BUREAU. *U. S. Dept. Labor, Women's Bur., Bull. No. 46, 1925, pp. 64.*

This bulletin consists of tables and charts showing distribution of women by main occupational divisions, proportion of women in each state gainfully occupied, age of women in each main occupational division, marital condition of working women, scheduled weekly hours of work and earnings in certain states, etc. It should be useful as a handbook in studying the working woman of the United States and her status in the industrial world.—M. C. S.

ABSENTEEISM OF WOMEN OFFICE EMPLOYEES. *H. W. Hepner. Jour. Personnel Res., April, 1925, vol. 3, pp. 454–456.*

Several years ago, the author, who was in charge of personnel research for a large rubber company in Akron, Ohio, made a study of absenteeism in order to help the company to determine whether salaried women office employees should have the same salaries as men when men and women were doing the same kind of work.

From a study of all the time cards, visiting nurses' calls, and dispensary calls for February, March, and April, 1920, it was found that women were absent from work, for all causes, two and one-half times as much as male employees. There were no material differences in working conditions or in the nature of the work which would cause one to expect more absenteeism of women. Moreover, the men, on the whole, had more responsible positions than the women.

In view of these figures, the company physician tabulated all reasons for absences of the women employees for one month, April 12, to May 11, 1920. These data showed that at least 17 per cent. of the absenteeism of the women office employees was caused by ailments peculiar to women only: dysmenorrhea and ovarian congestion. Absenteeism for both men and women was less on pay days than on other days. In one instance fifty employees were absent the day before pay day and only six were absent on pay day.

In addition to absenteeism, the factors of physical strength, physical endurance, training, interest in a job *versus* preference for marriage, etc., were considered. The officials of the company decided that although women may be intellectually competent to undertake any and all vocations, salaried women employees do not deserve the same pay as men even when they hold the same kinds of positions.—M. C. S.

THE WORKING CHILDREN OF PHILADELPHIA. *A. B. Griscom. Abstr. as*

follows from White-Williams Foundation, Bull. Series No. 3, 1924, pp. 45, in Jour. Personnel Res., May, 1925, vol. 4, p. 27.

This study comprises a survey of the work and working conditions of a large group of continuation school children in Philadelphia, made for the purpose of gathering information about wages, advancement into adult occupations, the industries where the largest number of children are employed, etc.

The occupations of the children are described. The nature of the work and the nature of the training received, the mental and physical qualifications, wages, and opportunities for advancement, are all dealt with in detail. In discussing the working conditions such topics as ratio of children to adult employees, nationalities, working hours, welfare and health conditions, employee representation, location and type of buildings are treated, and for fifteen special industries complete information as to employees, establishments, hours of labor, wages and occupations, and employee representation is given.

This survey and report is meant to be of assistance to employment counselors especially, but also to social workers, educators, and all those whose activities bring them in contact with child labor employment and the making of better citizens from this raw material.

INDUSTRIAL MEDICAL SERVICE: MEDICAL DISPENSARIES AND HOSPITALS IN INDUSTRIAL PLANTS

THE PROBLEMS OF INDUSTRIAL MEDICINE. *C. O. Sappington. Alameda County Pub. Health News, April, 1925, vol. 3, pp. 11–25.*

The problems discussed by the author are industrial absenteeism, industrial injuries, industrial ventilation and illumination, lead poisoning, fatigue, dust and its relation to lung disease, and carbon monoxide poisoning and resuscitation.

Industrial Absenteeism.—Nine tables from various sources are presented which bring out the following points:

1. Sickness is by far the greatest cause of industrial absenteeism.
2. The minor disabilities appear to cause the greatest amount of absenteeism.
3. In general the greatest incidence of disease causing absenteeism occurs in the age groups under 35 years.
4. Women apparently contribute more heavily to disease absenteeism than do men.

Industrial Injuries.—The discussion is limited to eye injuries and lacerations and infections of the hands. Eye injuries are divided into (1) those due to exposure to intense heat or industrial poisons, (2) those due to flying particles, and (3) those due to strain. Injuries caused by flying particles constitute by far the largest group. Goggles are the most effective means of protection from such injuries; in some grinding and chipping processes good results are obtained by attaching wire or glass screens to the machines.

Lacerations of the hands are responsible for more maimed hands than is any other type of injury. The

wounds are often very small and consequently are neglected, with the result that they become infected and lead to serious outcome. Workmen should exercise care when handling wrenches, hammers, etc., so as not to drop their tools on other workmen. Gloves should be worn on occupations where lacerations of the hands are liable to occur.

Industrial Ventilation and Illumination.—Brief consideration is given to temperature, humidity, and the instruments used in ventilation studies, and to the importance of good lighting.

Lead Poisoning.—Lead is used in over 150 industrial processes at the present time and in spite of research and preventive work lead poisoning is the chief toxic industrial hazard. A summary is given of the chief points in the literature with regard to the action of lead and to preventive measures. All applicants for lead work should be examined and should be refused if found to be physically subnormal.

Fatigue.—The author refers to studies which have been made on the subject of rest periods and gives a schedule proposed by a British investigator. In addition to fatigue due to energy expended he mentions fatigue due to emotional disturbances, to high temperatures and humidity, to poor lighting in workrooms, to poor posture at work, and to insufficient air exchange.

Dust and its Relation to Lung Disease.—A classification of dusts is given and methods of dust collection are discussed briefly. In industrial processes where a noticeable amount of dust is produced the author suggests the following investigative steps: (1) quantitative estimation of crystalline silicon dioxide in a sample of the air breathed by the workmen; (2) chemical analysis of the dust sample; (3) computation of a frequency distribution of the particle size; and (4) examination of the workmen for physical effects.

Carbon Monoxide Poisoning and Resuscitation.—This discussion includes precautions for workers and recommendation of the Schäfer prone pressure method of resuscitation and of the oxygen-carbon dioxide inhalator.—M. C. S.

INDUSTRIAL HEALTH AS A PURCHASABLE COMMODITY. *C. F. N. Schram. Safety Engin., May, 1925, vol. 49, pp. 195–203.*

Dr. Schram emphasizes the value of fitting the man to his job, and of keeping him in good health through a medical department. The industrial physician should make regular trips through the plant to keep a check on sanitation and to meet the employees on their home grounds. The employment department should keep accurate records of absenteeism, and such records as pertain to sickness and injury should be sent to the medical department for use. Dr. Schram estimates that $5 is about the average cost of medical service per employee per year.—M. C. S.

PHILADELPHIA HEALTH SURVEY OF INDUSTRIAL PLANTS. *Philadelphia Health Council and Tuberculosis Committee, Memorandum, Feb., 1925, vol. 3.*

A MEDICOSOCIAL SERVICE IN A FACTORY. *G. Poix. Presse méd., May 20, 1925, vol. 33, p. 667.*

ABSTRACT OF THE LITERATURE OF INDUSTRIAL HYGIENE

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GENERAL

INDUSTRIAL HEALTH UNDER NON-MEDICAL SUPERVISION. *E. R. Hayhurst. Jour. Am. Med. Assn., Aug. 22, 1925, vol. 85, pp. 560–564.*

With the exception of a few well-organized plants employing a physician, industrial hygiene today is hardly more than a legal function of state labor departments devoting its time to accident prevention and having no training in hygiene and the fundamentals of health conservation. Disastrous forms of ventilation, overheating, and illumination prevail. Poisons are tolerated. Tuberculosis rates are relatively high. Dublin's statistical deduction that industrial workers may expect eight years less of life than agricultural, commercial, and professional workers, and the finding of the New York Academy of Medicine that 72.7 per cent. of 958

people examined, chiefly from wage-earners' families, needed medical treatment, indicate conditions.

A remedial program should look toward joint industrial health control by the employer, the employees, and, as the public's representative, the local health department. Small neighboring plants may join in a system of organized medical, dental, and nursing service, in which the first step should be the promotion of physical examinations. Enforcement may be assisted by co-operation with the state labor department.—E. S. C.

THE RÔLE OF THE STATE IN INDUSTRIAL HYGIENE. *E. R. Hayhurst. Am. Jour. Pub. Health, Aug., 1925, vol. 15, pp. 681–685.*

In his conclusions the author states that (1) taking the states as a whole, very few are giving any attention in an official way to the subject of industrial hygiene and, outside of "sanitation," to the health of the worker or to the prevention of occupational diseases; (2) standards in regard to healthful working conditions are practically lacking in statutes and occur only in half a dozen state departmental regulations; (3) enforcement is almost a dead letter in many of the states which report some organization, laws, or regulations covering industrial hygiene, principally because of shortage of personnel or lack of understanding of the subject; (4) the personnel provided, with the exception of a handful of states, is employed on safety work and other matters; (5) serious consideration should be given to the placement of the subject of industrial hygiene—whether it should be in labor departments or in health departments.—B. L. G.

SYSTEMIC OCCUPATIONAL DISEASES: OCCURRENCE, TREATMENT, AND PREVENTION

LOCKSMITHS' CANCER. *H. Stahr. Abstr. as follows from Ztschr. f. Krebsforsch., Aug. 22, 1925, vol. 22, p. 379, in Jour. Am. Med. Assn., Oct. 24, 1925, vol. 85, p. 1342.*

A locksmith, whose arms had been specially exposed for a long time to radiating heat, developed a squamous cell carcinoma on the right arm. Stahr believes that the repeated occupational thermal irritation was responsible for the production of the malignancy.—K. R. D.

CIRCULATORY SYSTEM

THE GEOGRAPHICAL DISTRIBUTION OF HEART DISEASE IN ENGLAND AND WALES. *M. Young. Lancet, Sept. 19, 1925, vol. 2, pp. 590–593.*

The author finds that death rates from heart disease are definitely higher than elsewhere in the counties toward the west and that a definite association exists between these death rates and mortality from acute rheumatism. The influence of occupation in determining the onset of heart strain and valvular disease is examined statistically and no evidence is found in favor of the claim so often made that it is of great import; thus the mortality from this disease among coal miners

and metal workers is below the average, nor is it consistently high for any occupational group concerned with considerable physical exertion.—E. L. C.

POISONOUS HAZARDS AND THEIR EFFECTS: GASES, CHEMICALS, ETC.

THE CHEMIST AND HIS CONTRIBUTION TO INDUSTRIAL HEALTH. *J. G. Cunningham. Nation's Health, Sept., 1925, vol. 7, pp. 599–601.*

The prevention of occupational poisonings concerns three groups: the employer, the chemist, and the physician. The chemist has studied the hazardous substances in use in industry and his field experience is indispensable to intelligent investigation.—E. S. C.

INDUSTRIAL POISONING BY AROMATIC COMPOUNDS. *D. H. Killeffer. Indust. and Engin. Chem., Aug., 1925, vol. 17, pp. 820–822.*

This article is written primarily from the standpoint of the manufacturing chemist, superintendent, or engineer, and discusses the prevention of poisoning rather than its symptomatology or clinical treatment.

The chief poisons mentioned are "benzene, aniline oil, nitrobenzene, dinitrobenzene, *m*-nitroaniline, *p*-nitroaniline, dinitrochlorobenzene, chlorobenzene, the azo derivatives of these, nitrosodimethylaniline, and to a lesser extent the corresponding derivatives of toluene and xylene."

The preventive measures advocated are (1) cleanliness of workmen, (2) general cleanliness of the plant, (3) adequate ventilation, (4) avoidance of leaks in apparatus, (5) periodic medical examinations, (6) limiting the personnel to men, who are generally less susceptible than women.

The author concludes with two paragraphs on the comparative toxicity of different compounds, the effect of introducing methyl, ethyl, or nitro groups into the benzene ring.—P. D.

POISONING BY TETRA-ETHYL LEAD: POSTMORTEM AND CHEMICAL FINDINGS. *C. Norris and A. O. Gettler. Jour. Am. Med. Assn., Sept. 12, 1925, vol. 85, pp. 818–820.*

This paper presents the postmortem protocols, the microscopic reports, and the chemical analyses of four cases of an occupational disease acquired during the manufacture of tetraethyl lead. The striking microscopic features were the intense engorgement with frank hemorrhage of the lungs in Cases 1 and 2, general visceral congestion, except for the liver, and congestion of the vessels of the brain with red blood cell thrombi. The following is a summary of the chemical findings:

1. A volatile lead compound was isolated and proved in the brain tissue in two of the four cases. The amount of this compound that remained in the two brains up to the time of the analysis was 4.25 mg. and 4.77 mg. The rest of the lead in these brains was in a nonvolatile form. The fluids of the tissues had hydrolyzed most of the tetra-ethyl lead into a nonvolatile lead salt. In the two cases in which no such compound could be isolated, the patients lived twenty-seven and forty-nine hours, respectively, longer after exposure to the tetra-ethyl lead.

This additional time interval evidently hydrolyzed all the tetra-ethyl lead into a nonvolatile form. No volatile lead compound could be isolated from any other tissues.

2. The total amounts of lead found in the various tissues analyzed are given in the tables.

3. Contrary to the usual findings in lead poisoning, the bones in these cases did not show a very high lead content as compared to that found in the other tissues. Calculated on equal portions of tissue, the brain and liver exceeded the bones in the lead content.

4. The brain tissue in these cases contained much more lead than is usually found in cases of lead poisoning. This can be explained, perhaps, by a specific attraction of brain tissue for tetra-ethyl lead.

5. The lungs also showed a somewhat high quantity of lead, indicating absorption through them.

6. The liver and kidneys contained a very large amount of lead, indicating a process of attempted removal from the body.

7. All the organs, including the blood, contained lead. This points to a very recent intake of lead in some form.

8. A small amount of mercury was found in the liver and in the kidneys in all four cases.

—K. R. D.

THE CEREBROSPINAL FLUID IN LEAD POISONING. *C. V. Weller and A. D. Christensen. Arch. Neurol. and Psychiat., Sept., 1925, vol. 14, pp. 327–345.*

The authors summarize their paper as follows:

In this paper, by combining material derived from historical, clinical and experimental fields, we have endeavored to develop a definite conception of the cerebrospinal fluid in lead meningo-encephalopathy. We have shown by selected references from the literature the gradual separation from the group of lead encephalopathy of a subgroup in which evidence of meningeal involvement plays an important part. The cerebrospinal fluid findings of this group have been summarized and found to be fairly constant, but not in themselves diagnostic. The value of the recognition of lead in the fluid itself, if it occurs there, at once becomes evident. Its successful recognition has twice been reported. Since administration of lead to laboratory animals by various methods, including injection into the spinal canal, produces a clinical condition comparable to human lead meningo-encephalopathy, with histologic changes in accordance with the findings in the cerebrospinal fluid of human cases, experimental investigation of the fluid of animals is justified. Having, we believe, successfully demonstrated the passage of lead into the cerebrospinal fluid of lead poisoned rabbits by means of Fairhall's modification of the hexanitrite test, we have arranged an adaptation of this test suitable for the clinical laboratory examination of cerebrospinal fluid. If it is found that lead is transmitted to the fluid in human cases as it seems to be in the rabbit, this method should prove of great diagnostic value.

THE TOXIC EFFECTS OF LEAD ADMINISTERED INTRAVENOUSLY. *W. B. Bell, W. R. Williams, and L. Cunningham. Lancet, Oct. 17, 1925, vol. 2, pp. 793–800.*

Observations are recorded made while injecting metallic lead in colloidal form intravenously in the course of treating malignant neoplasia. The results of treatment are not recorded here. Great differences in individual tolerance to lead were found. The quantity necessary to produce toxic symptoms varied directly with body weight; older patients tolerated lead better than young ones, and men better than women. Patients with large growths tolerated doses which those with smaller growths did not; apparently malignant growths have the power of attracting lead so that it becomes locked up in the tumor far more than in the normal tissues of the

body. Small doses given over a long period of time produced dangerous cumulative effects, which the same amount of lead given in a few large doses administered at long intervals did not. The authors summarize their findings and conclusions, which are of some importance, as follows:

Blood Changes.—1. Lead causes changes in the red cells. There is punctate basophiiia, which may appear within a few hours of initial dose. Anaemia and its accompaniments, polychromasia, anisocytosis, and poikilocytosis occur later. This anaemia may be only temporary, or, if bone-marrow be involved, may persist.

2. Leucocytosis has frequently been observed, especially when the blood has been examined shortly after an intravenous administration of lead. Leucopenia occurs occasionally. Neither of these phenomena appears to be constant.

3. A slight relative lymphocytosis may occur, but this is not generally marked.

4. There is a definite increase in the number of granular forms of leucocytes.

5. Anaemia is a consequence of the long-continued administration of lead, and it is accompanied by the usual symptoms of that condition—namely, headache, lassitude, and palpitation. In women there may be amenorrhoea. This last named is not constant, and depends on many circumstances.

Alimentary System.—1. Blue line at the gum edge is rarely seen when lead is administered intravenously.

2. Nausea and vomiting appear to be dependent on the amount of lead administered, but occur after a smaller total quantity when given in massive doses, rather than after the long-continued administration of small doses.

3. Intestinal colic occurs with considerable frequency after the administration of massive doses; it is not seen after the long-continued administration of a smaller quantity of lead.

4. Constipation and diarrhoea have not been observed as definite phenomena supervening under the treatment adopted.

Nervous System, Including the Retina.—1. Psychopathies may occur after the intravenous administration of lead; they are, however, rare.

2. Neuropathies do not occur when lead is administered in the manner mentioned.

3. The retina may be affected; in these circumstances it is probable that it is a concomitant of renal involvement.

The Kidney.—1. The toxic effect of lead on the kidney as the result of intravenous therapy is sufficiently frequent and of such magnitude as to require the greatest caution in the administration of this drug, especially in large doses.

2. The functional impairment caused by many small doses is smaller in degree but more permanent than that caused by occasional large doses.

3. The earliest indications of renal failure appear to be: (*a*) Diminution in the quantity of urine secreted; (*b*) the presence of albuminuria; and (*c*) the presence of oedema.

4. A rise in blood-urea does not occur, as a rule, until the damage is sufficiently great to be detected clinically. Changes sufficiently great to be of value have not been observed in the urea-concentrating power of the kidney.

5. As in nephropathies due to other causes, it is difficult to correlate functional impairment with pathological change. A case which showed advanced cloudy swelling in three-quarters of the tubules has good renal efficiency as determined by the usual tests.

The Liver.—Pathological changes are not so marked in the liver as in the kidney, and the main impairment of function seems to be connected with the bile-producing mechanism.

General.—The administration of lead is a form of treatment that should never be attempted by those who have not complete laboratory facilities at their disposal, and who have not studied for some time the actual treatment of patients.

The article is illustrated and contains several tables giving detailed results of the observations made.—E. L. C.

RADIUM (MESOTHORIUM) NECROSIS. *F. L. Hoffman. Jour. Am. Med. Assn., Sept. 26, 1925, vol. 85, pp. 961–965.*

Hoffman reports twelve cases of radium necrosis of the jaw, resembling phosphorus necrosis, with four deaths, among former employees of a radium plant engaged in the manufacture of luminous watch dials. The necroses were due, in the author's opinion, not to general exposure or nearness to radioactive substances but to the introduction of such substances into the mouth through the practice on the part of the workers of penciling the point of the brush with the lips.—K. R. D.

DUST HAZARDS AND THEIR EFFECTS

STUDIES ON THE INDUSTRIAL DUST PROBLEM: III. COMPARATIVE FIELD STUDIES OF THE PALMER APPARATUS, THE KONIMETER, AND THE IMPINGER METHODS FOR SAMPLING AERIAL DUST. *L. Greenburg. U. S. Pub. Health Rep., July 31, 1925, vol. 40, pp. 1591–1603.*

The author first discusses previous comparative field studies by other writers. Based on dust content, the atmospheres studied by Greenburg in this report (see also THIS JOUR., 1925, vol. 7, Abstr. Section, pp. 137, 172) ranged from outdoor country air during a rainstorm to the air of a sand blasting shop. In all, 100 samples were taken and the results tabulated and compared (see table below):

The author recommends that "a konimeter be used for studies of atmospheres of *low or medium dust content* where the desideratum is quickly to establish the conditions of the atmosphere. For plant engineers it is to be highly recommended. The impinger is highly efficient, samples a large volume of air, and has low control errors, and by using it both a weight and count of the dust may be secured. It is recommended for use in all intensive dust studies, no matter how high or low the dust concentration may be."—P. D.

RATIO OF DUST COUNTS OBTAINED WITH THE PALMER, KONIMETER, AND IMPINGER APPARATUS

ATMOSPHERE		RATIO		
		K/P	K/I	I/P
(1) Low dust content, outdoor and normal air	Minimum	0.50	0.01	3.10
	Maximum	24.00	1.80	103.00
	Average	6.24	0.62	22.36
(2) Dusty workshops, grinding, polishing, etc	Minimum	0.07	0.24	0.58
	Maximum	23.10	3.98	17.50
	Average	7.55	1.58	5.10
(3) Very dusty atmospheres, sand blasting shop	Minimum	0.06	0.01	4.00
	Maximum	0.11	0.02	15.40
	Average	0.073	0.008	7.35

COMPARATIVE TESTS OF INSTRUMENTS FOR DETERMINING ATMOSPHERIC DUSTS. *S. H. Katz, G. W. Smith, W. M. Myers, L. J. Trostel, M. Ingels, L. Greenburg. U. S. Pub. Health Bull. No. 144, 1925, pp. 69.*

This report is divided into two parts. The first part, 62 pages, includes comparative tests on the sugar tube, Palmer apparatus, Kotzé konimeter, paper thimble, Anderson-Armspach dust determinator, and Greenburg and Smith impinger. The second part, 7 pages, describes the history, development, and construction of the impinger.

The entire report is well prepared and includes numerous cuts and charts illustrating the subject matter. The dusts used were: (1) metallic iron, of which the particles were about 5 microns in diameter; (2) grain, from a corn elevator, with particles ranging from 50 to 70 microns down to 1 micron, most of the particles being under 15 microns; (3) silica, 88 per cent. of which passed through a 200-mesh screen, giving particles ranging down to less than 1 micron; (4) limestone, ground to 250 mesh, with particles ranging down to 1 micron; and (5) anthracite coal, screened to 325 mesh and with particles ranging down to 1 micron.

Dust clouds were floated by bubbling dry air through dried dust contained in a glass bottle provided with baffles and a glass wool screen, so that a well-dispersed cloud of small particles came out of the top. This cloud was suspended in a gas tight cabinet of 1,000 cubic feet capacity, the weight of dust added being determined by weighing the dust floater before and after dusting.

Air was sampled simultaneously by all instruments grouped close together. The konimeter, which takes grab samples, was snapped at two-minute intervals, giving seven samples for each one of the other instruments.

Descriptions are given of each instrument, followed by a discussion of the advantages and disadvantages of the various instruments. Tabulated results of the comparative tests are given.

In conclusion the authors state:

> Factors for converting dustiness in terms of one method to those of another have been derived (konimeter and dust determinator are not included). Considering the dust caught by the Palmer as unity the instruments take the following order: On basis of numbers of particles determined—impinger, 5.0; sugar tube, 2.1; and Palmer apparatus, 1.0. On basis of weight of dust determined—impinger, 2.1; thimble, 1.5; sugar tube, 1.6; and Palmer apparatus, 1.0.

These various apparatus have been tested previously against tobacco smoke by matching the intensities of a Tyndall beam from the air escaping through the apparatus with the intensity of like beam of controlled smoke concentration. The results showed the following efficiencies: sugar tube, 35 to 40 per cent.; Palmer apparatus, about 13 per cent.; thimble, 46 per cent.; paper filters of different qualities, 63 to 90 per cent. (the A-A determinator uses filter papers as the retention medium); and the impinger, 66 per cent.

Against silica dust suspensions the Tyndall efficiencies are: sugar tube, 70 to 80 per cent.; Palmer apparatus, 20 to 30 per cent.; thimble, 81 per cent.; and impinger, 93 per cent.

In Part II are described a series of experiments to determine the optimum size and shape of impinger tubes.

The tube finally adopted is 16 mm. in outside diameter at the entrance, while the exhaust end is tapered down to a 2 to 3 mm. hole and is placed 5 mm. from a bronze impinger plate. The tube, with a convenient holder for the plate, is held in a 16-ounce bottle filled with 200 c.c. of water. Dusty air is drawn through the tube and impinged on the plate, which is continually washed off by the water. The optimum rate of sampling is about 1 cubic foot per minute. For field use, where power is not available, a hand driven rotary suction pump for taking samples is proposed.

In calibrating the final type of impinger adopted, the Tyndall efficiencies were found to be about 38 per cent. against tobacco smoke and about 96 per cent. against silica dust. This is not so high as the recoveries obtained with the use of numerous small holes of total cross-sectional area about equal to a single hole of 2 to 3 mm. diameter. The single-holed tubes are simpler to make and the loss in efficiency from their use is negligible.

In the final paragraph the authors write:

> Considering, finally, the ease of sampling with the impinger, its greater efficiency as a dust catcher, and the greater accuracy attainable in analyzing the samples, it appears that the impinger will ofttimes displace the sugar tube and other instruments for sampling dusty atmospheres. In none of the requirements for a satisfactory dust sampling instrument does the impinger appear at a disadvantage.
>
> —P. D.

How Dusty Is Air? *M. Ingels. Jour. Am. Soc. Heating and Ventil. Eng., Aug., 1925, vol. 31, pp. 415–418.*

Tabulated and charted data are here given on the comparative dustiness of department stores, hotels, schools, railroad terminals, steel mills, an enameling plant, and outdoor air in the Pittsburgh district. Determinations were made by the A-A determinator; abstracts concerning this dust determinator have appeared in This Journal (see 1923–1924, vol. 5, p. 54; 1925, vol. 7, p. 137).—P. D.

Harmful Dusts, Gases, and Fumes Are Industrial Menaces. *J. Roach. Nation's Health, Sept., 1925, vol. 7, pp. 609–611.*

The problem of removing dust, poisonous or nonpoisonous, is the most serious one that confronts industry today. Vapors and dust should be confined at the point of origin and removed to the outer air in such a manner as to prevent them from contaminating the breathing atmosphere of workmen. The experience of the industries in New Jersey, where certain standards for removal of dust, vapors, etc., are enforced, shows that ventilation problems no longer offer insuperable difficulties to the engineering world.—E. S. C.

Dust Explosions in Industrial Plants. *H. R. Brown. Indust. and Engin. Chem., Sept., 1925, vol. 17, pp. 902–904.*

The Bureau of Chemistry of the United States Department of Agriculture has shown that "practically all combustible dusts and some dusts not generally considered combustible will explode with violence under favor-

able conditions, when mixed with the proper proportion of air and ignited by a flame, spark, or other source of ignition."

There are in the United States at the present time approximately 22,000 establishments manufacturing dusty products, such as starch, feed, cocoa, spice, and sugar, or producing dust during the manufacture of wooden ware, aluminium ware, corks, etc. The dust explosion hazard, present in these 22,000 manufacturing plants, exists also, in smaller degree, in the thousands of warehouses, transfer stations, and similar establishments where large quantities of the dust or dusty material are handled either in bulk or package form.

All the methods suggested for reducing the dust explosion hazard in dusty industries fall into three general recommendations:

(1) Prevent the formation of dust clouds or the accumulation of dust in sufficient quantity to form a cloud, either by maintaining general plant cleanliness or by installing dust-collecting equipment.

(2) Eliminate all sources of ignition.

(3) Maintain an atmosphere of reduced oxygen content incapable of supporting a dust explosion where it is impossible either to prevent the formation of dust clouds or to eliminate the sources of ignition effectively.

—P. D.

SILICOSIS AMONG MINERS. *R. R. Sayers. U. S. Bur. Mines, Tech. Paper 372, 1925, pp. 24.*

This study begins with a review of the literature, which is followed by a discussion of the conditions promoting silicosis, including the chemistry of the important silicosis producing dusts; the effects of rock dust on the lungs; the stages of silicosis, with X-ray photographs of fibrotic chests; methods of determining silicotic dusts in air; methods of protection against dust, such as wet drilling and the use of water sprays and water blasts. In his discussion of the advantages of periodic medical examinations, the author points out the importance of the initial examination of prospective miners and the advisability of rejecting men suspected of either tuberculosis or silicosis. The interrelation of silicosis and tuberculosis is one of the main themes of the paper.

The author describes the experience of the physician in diagnosing and preventing silicosis, together with the measures found by the mining engineer to reduce dustiness, in a way which makes this paper an especially useful contribution.—P. D.

OCCUPATIONAL AFFECTIONS OF THE SKIN AND SPECIAL SENSES

DERMATOSIS INDUSTRIALIS IN A BLUE PRINT WORKER DUE TO CHROMIUM COMPOUNDS. *H. J. Parkhurst. Arch. Dermat. and Syph., Aug., 1925, vol. 12, pp. 253–256.*

The author reports one case which has come under his own observation and cites five other cases—three from the literature and two reported to him in a personal communication from Dr. C. G. LaRocco of Cleveland. He concludes as follows:

"It is apparent that erythematovesicular and small papular dermatitis may follow contact of potassium bichromate with the skin in susceptible persons, and that this dermatitis may be avoided by frequently rinsing the

exposed skin with a saturated solution of sodium bisulphite, and then with water.

"Therefore, it would seem desirable that this precaution be considered in establishments in which blue printing is done by hand, or that properly fitting, intact rubber gloves be worn by the workers."—M. C. S.

BAKERS' DERMATITIS. *N. H. Mummery. Lancet, Sept. 26, 1925, vol. 2, pp. 647–648.*

The writer suggests that a certain fungus which he has isolated may be the cause of this dermatosis. The trouble is not confined to persons actually handling flour, dough, or sugar, but affects others in different parts of a large, up-to-date food factory, and may be spread by dust. The early lesions are very itchy and vesicular. At first they are confined to the palmar aspects and digital folds of one or both hands. Microscopic examination of the exudate reveals the presence of numerous yeast-like mycelial growths. The disease is communicable from person to person by inoculation through minute abrasions. Mummery infected himself on the palm with the fluid from a patient's vesicle. This apparently caused a similar lesion on the skin of the author. He kept it active for eight months and the yeast-like bodies were recoverable. The complaint is easily controlled. In this factory where 5,000 people are employed, two-thirds of whom are engaged on food producing processes, only three persons are under treatment at the present time.

The prophylaxis and treatment are fully described. For the latter the following ointment is found most effective: subchloride of mercury, 33 per cent. in anhydrous lanolin. It must be applied liberally with vigorous rubbing and covered over to exclude the air.—R. P. W.

TWO FORMS OF DERMATITIS DUE TO THE USE OF METHYLATED SPIRIT EXTERNALLY. *P. B. Mumford. Brit. Med. Jour., Oct. 3, 1925, vol. 2, pp. 607–608.*

The occurrence of dermatitis among the surgical staff of the Manchester Royal Infirmary and among barbers in the City is ascribed to pyridine used by manufacturers as a denaturant of methylated spirit. Pyridine obtained by evaporating down the spirit caused irritation when rubbed into the skin.—E. L. C.

FOREIGN BODY IN THE IRIS. *A. A. Burke. Am. Jour. Ophth., July, 1925, vol. 8, pp. 562–563.*

A case is cited in which a piece of steel penetrated the interior of the eye, causing practically no inconvenience at the time and arousing no suspicion in the patient's mind that anything was in his eye. It was not until several hours after the injury that the eye began to pain. An X-ray picture taken two days after the injury was negative. The author suspected, however, that there was a small foreign body in the iris, covered over by exudation, and applied the magnet to make sure. He then made an incision in the cornea and withdrew the piece of steel with the magnet. He emphasizes the point that X-ray findings must not be accepted as final in any eye case.—M. C. S.

FOREIGN BODY IN THE EYE AS AN INDUSTRIAL MENACE. *W. I. Clark and H. W. Robbins. Nation's Health, Aug., 1925, vol. 7, pp. 548–549.*

A study of all cases of foreign bodies in the eye has been made at the Norton Company, Worcester, Mass., where the work consists mainly of the manufacture of abrasives, grinding wheels and machines. It was shown that the hazard to the eyes was greater than is usually appreciated and that the compulsory wearing of goggles will reduce eye injuries from foreign bodies more effectively than any other procedure.—E. S. C.

PROPAGANDA SAVES WORKERS' EYES. *S. DeHart. Hosp. Management, July, 1925, vol. 20, p. 65.*

By means of a four-year campaign to minimize the severity of eye accidents, the R. K. LeBlond Machine Tool Company has been able to reduce the number of accidents due to foreign bodies entering the eye during a year from 5,016 to 789. Bulletin board propaganda was a large factor in the campaign. Glass shields, placed over the grinding wheels, and goggles also helped to bring about the reduction.—M. C. S.

INDUSTRIAL EYE INJURIES. *R. Caldwell. South. Med. Jour., Aug., 1925, vol. 18, pp. 619–621.*

The importance of taking the vision in all injured eyes and keeping a record of it is emphasized by the author who is oculist and aurist for two large railroads. A crude hand drawing is made on the patient's card of every eye injury, if it is only a cinder, and this card is filed with a record of the treatment. In removing a foreign body from the eye, every instrument is sterilized in boiling water before touching the cornea, a sharp corneal spud is used, and not only the foreign body is removed, but the dead epithelial débris is picked away and a prescription of 10 per cent. argyrol is given to be used in the eye every two to three hours. A bandage is not applied as a routine. Puncture wounds of the eye comprise the most serious cases in the author's experience. As soon as a patient is brought in suffering with steel in the eyeball, an effort is made at removal through the wound of entry. If this cannot be done without further injury to the eyeball, the patient is immediately sent to the roentgenologist and the foreign body identified. If possible, the steel is pulled into the anterior chamber by means of the giant magnet, the current is turned off, a corneal incision is made if it is not already present, then with the point of magnetized scissors the steel is pulled out. In case the steel is found entangled in the iris, an iridectomy is performed. In two of the author's cases, the steel had entered the lens and lodged in or behind it, producing a traumatic cataract; the steel was removed through the wound of entry, atropine was instilled, and the patient sent to hospital. Although both of these cases had traumatic cataracts, no attempt was made to remove the lens at the time the steel was removed. At the end of one week each lens was milked out over the blade of a keratome without the least difficulty.

Two other cases are reported with some detail.—B. L. G.

NYSTAGMUS. *J. Ohm. Abstr. as follows from Med. Klin., June 5, 1925, vol. 21, p. 839, in Jour. Am. Med. Assn., Aug. 8, 1925, vol. 85, p. 478.*

Ohm examined about 1,400 cases of nystagmus in miners and 300 in other persons, making exact registrations. The cause of nystagmus in miners is chiefly the insufficient light. The disturbance was not observed until the safety lamps came into use, and Raudnitz discovered an identical condition in children kept in dark apartments. The frequency of the nystagmus movements varies between fifty and 400 per minute. At the close of the nystagmus, the amplitude of the waves sinks to one-fiftieth mm., while the frequency may increase to twelve to fifteen per second. He believes that it is only an exaggeration of a physiologic vibration of the eye, the frequency of which is above 2,000 per minute. The brain impulses seem to be tuned down because of the strain and other causes. The vestibular apparatus and the conscious will also play a rôle.—K. R. D.

OCCURRENCE AND PREVENTION OF INDUSTRIAL ACCIDENTS

ELEPHANTIASIS FROM INDUSTRIAL ACCIDENT. *G. Muccini. Abstr. as follows from Policlinico, Rome, Aug. 10, 1925, vol. 32, p. 1117, in Jour. Am. Med. Assn., Sept. 26, 1925, vol. 85, p. 1010.*

Muccini gives an illustration of a case of elephantiasis of the genital organs and legs which developed after an industrial accident—a blow in the right inguinal region from falling lumber.—K. R. D.

INDUSTRIAL PHYSIOLOGY: NUTRITION, METABOLISM, FATIGUE, ETC.

THE INFLUENCE OF POSITION ON THE VITAL CAPACITY AND PERCENTAGE OF SUPPLEMENTARY AIR IN NORMAL PERSONS AND IN PATIENTS WITH LARGE SPLEENS. *F. T. Hunter. Boston Med. and Surg. Jour., Aug. 6, 1925, vol. 193, pp. 252–254.*

In normal persons not only the vital capacity but also the percentage of supplementary and residual air are greater in the sitting than in the lying position.

A large spleen may play a definite rôle in decreasing the percentage of supplementary air, but it does not necessarily cause the low vital capacity which occasionally occurs in myelogenous leukemia.—B. L. G.

CLINICAL SPIROGRAPHY. I. PULMONARY RESPONSE TO WORK IN NORMAL, OBESE, CARDIAC AND ANEMIC PERSONS. *S. G. Mudd and J. H. Means. Boston Med. and Surg. Jour., Aug. 13, 1925, vol. 193, pp. 297–309.*

This paper is the first of three dealing with spirographic studies on a variety of problems and considers the effect of muscular work, both in normal and in pathologic subjects. The mechanism employed consisted of the Roth modification of the Benedict metabolism apparatus, to which a kymograph and a timing device were attached. The exercise chosen was stair climbing, as it is a part of the routine life of the normal individual.

Charts give the results obtained in the four groups of patients studied—namely, obese, cardiac, normal, and anemic—with respect to total ventilation, volume per breath, respiratory rate, pulse rate; rebreathing carbon dioxide to show increase in ventilation with a normal adult and with patients having secondary anemia and pulmonary emphysema; and carbon dioxide dissociation curves for normal whole blood, normal plasma, whole blood in cases of secondary anemia, diabetic coma, and uremic coma. Respiratory tracings are given showing response of individuals from each group to the exercise.

The obese groups showed the most marked increase in total ventilation—which might be due in part to diminished cardiac reserve—in volume per breath, and in respiratory rate. The group with compensated cardiac disease showed an increase in total ventilation about two-thirds as marked as in the obese group, produced by an increase in the volume per breath as well as an increase in respiratory rate. The normal group showed an increase in total ventilation one-third as marked as in the obese group and nearly one-half as pronounced as in the cardiac group, produced almost entirely by an increase in volume per breath. The anemic group showed an increase in pulmonary ventilation less than the normal group, the reduced increase being produced by an increase in volume per breath, associated with an actual reduction in respiratory rate, and being associated with an increased tolerance for carbon dioxide. In each of the pathologic groups studied, there were persons who responded quite like normal individuals, others who reacted in a very abnormal manner, as well as variations between the two.—B. L. G.

THE PHYSIOLOGICAL BASIS OF ATHLETIC RECORDS. *A. V. Hill. Lancet, Sept. 5, 1925, vol. 2, pp. 481–486.*

Human activity in this address is examined in a novel way. Athletic records are taken, the pace attained per second is calculated for different distances from 100 yards upward. The results are shown in graphic form. Records for men and women (where available) are considered for running, walking, swimming, skating, bicycling, and rowing. The curves are found to have much in common, showing a high pace for short distances which falls off more or less rapidly and then approximates at longer distances to a straight line. It is shown that "the ideal way to run a race, possibly not from the point of view of winning it, but certainly from that of breaking the record for the distance, is to run it at constant speed." In this connection our readers will record "The Ideal Work-Curve" by T. Bedford in THIS JOURNAL (1922–1923, vol. 4, pp. 235–245). Human activity at work and play clearly presents similar characteristics.

Professor Hill considers athletic records from the point of view of oxygen intake, oxygen requirement, and oxygen debt. He points out that muscles have a mechanism, depending on the formation of lactic acid in them, by which a large amount of oxidation may be put off to a time after the exercise has ended; in other words, muscles can go into oxygen debt. When an oxygen debt of about 15

liters has been incurred, the body becomes incapable of further effort; it is completely fatigued. The limit of speed is reached when this debt has been incurred. Oxygen requirement increases far more rapidly than speed, more like the second or third power of the speed, so that high speeds and intense efforts are very wasteful. Activities of men and women are compared and the conclusion is drawn that the ratio of the amount of energy expended by a woman in a given time as compared with that by a man of the same weight is about two-thirds. The teaching of athletes, like motion study for industry, consists in training the performer to carry out the same movements at a given speed for a smaller expenditure of energy. The author finds that to exert a powerful force in a moderate rhythm is not anything like so tiring as to exert a much smaller force in a frequent rhythm. He points out that "our footsteps are dogged by the viscous-elastic properties of muscle, which prevent us from moving too fast, and which save us from breaking ourselves while we are attempting to break a record." He claims, and justly, that the practice of athletics is both a science and an art; the same may be said for industrial activity. He concludes that even if scientific contemplation has given only some explanation of what every sportsman knows, still extra interest is added thereby to the study of activity.—E. L. C.

THE INFLUENCE OF SHORT TIME ON SPEED OF PRODUCTION. II. *G. H. Miles and A. Angles. Jour. Nat. Inst. Indust. Psychol., July, 1925, vol. 2, pp. 300–302.*

In confirmation of Vernon and Bedford (see THIS JOUR., 1925, vol. 7, Abstr. Section, p. 105) who found that in several light occupations the speed of production reached a maximum during a forty-hour week, and fell off distinctly both when longer and shorter hours than this were worked, the writers of this second report found that in box making a similar relationship showed itself. Thus when a thirty-six-hour week was worked, the hourly rate of production was 4.2 per cent. below the forty-hour standard; and when forty-four-hour and forty-eight-hour weeks were worked, the rates were 3.4 and 8.5 per cent., respectively, below it. Apparently the forty-hour week was accepted as the norm; hence a reduction or an increase of hours caused a dislocation of the habitual working pace, and it took some weeks to adjust the working pace and establish a new norm. Again, short time tends to breed dissatisfaction and discontent in the workers, and there are other psychic factors which assist in producing the observed result.—H. M. V.

CAN LABORATORY EXPERIMENTS ON OUTPUT THROW LIGHT ON PROBLEMS OF INDUSTRIAL FATIGUE? *H. M. Vernon. Brit. Jour. Psychol., 1925, vol. 15, pp. 393–404.*

Laboratory experiments are usually made on a very small number of subjects for a period of only a few weeks, and the work periods generally last for fewer hours than those imposed on genuine industrial workers. Hence the subjects can work at maximum speed as they have ample time for recuperation in nonworking hours. Recent evidence shows that most in-

dustrial workers, taken as a group, maintain a nearly even rate of production throughout the working day, except for the first half hour, when they are "warming up." Individual workers, however, are very far from attaining an even standard. Evidence is adduced to show that in several different occupations such as labeling, making cartons, etc., individual workers (thoroughly experienced) showed hourly outputs which varied from their respective mean outputs so widely as to give coefficients of variability amounting to from 7.4 to 14. Again, even the average hourly output of a group of girls, though usually nearly uniform during the working day, was found to show a fall of 10 per cent. during the course of each work spell when a period of hot weather suddenly set in. Moreover, laboratory tests usually differ in character from genuine industrial operations, and it is very hazardous to argue from results obtained in one operation to those which may be obtained in another. Thus observations on the hourly frequency of spoilt work in industry give most divergent results in different occupations, the maximum by no means always occurring at times when the workers are most fatigued. Again, observations on the effects of rest pauses on output differ widely in laboratory experiments and under industrial conditions. Hence it is concluded that in order to obtain information which can be directly applied to industrial problems, it is necessary to collect this information strictly under industrial conditions.

Manual Work in the Tropics. *W. R. Dunlop. Jour. Nat. Inst. Industrial Psychol., July, 1925, vol. 2, pp. 305–312.*

Observations were made on the output of groups of industrial workers in Trinidad. Six laborers were set to fork parallel strips of land 18 feet wide, and the work done was marked off every fifteen minutes. On an average, output rose from about 4 to a maximum of 6 during the first two hours, and fell gradually in the next two hours to 3. After one and a quarter hours' rest it started again at 2 and in the next hour worked up to 4, but then it rapidly dwindled, and most of the workers ceased altogether, in spite of pecuniary inducements to go on, for their normal working day is only four or five hours.

Two boys employed in potting cacao worked for two four-hour spells, with a one-hour break in between, and their output was more steady. It reached a maximum in the third hour of the first spell, but fell off rather rapidly in the last two hours of the afternoon spell. Other observations were made on the tappers of rubber trees. Some were observed to use more common sense than others, *e.g.*, to tap the best trees first, for these usually flow longest and might delay completion of the task if left till the end. Other qualitative observations were made on sugar cane cutters.—H. M. V.

Hours of Labour in Industry, United States. *Internat. Labour Office, Studies and Rep., Series D (Wages and Hours) No. 14, 1925, pp. 120.*

Night Work in Bakeries. *Communications from Governments on the*

Proposed Draft Convention Provisionally Adopted by the Sixth Session of the International Labour Conference. (Final Vote.) Internat. Labour Office, 1925, pp. 24.

WEEKLY SUSPENSION OF WORK FOR TWENTY-FOUR HOURS IN GLASS-MANUFACTURING PROCESSES WHERE TANK FURNACES ARE USED. *Communications from Governments on the Proposed Draft Convention Provisionally Adopted by the Sixth Session of the International Labour Conference. (Final Vote.) Internat. Labour Office, 1925, pp. 16.*

WOMEN AND CHILDREN IN INDUSTRY

REDUCING ABSENTEEISM OF WOMEN. *H. D. Martin and C. S. Wayman. Hosp. Management, July, 1925, vol. 20, pp. 62–65.*

This article gives the results of a study of absenteeism among the women workers of the United States Shoe Company of Cincinnati. Before the organization of the medical department 35 per cent. of the complaints registered per month were headaches. This problem was, therefore, one of the first matters to be investigated by the department. It was suspected that the cement used in the fitting room might be responsible for a large number of these headaches; an examination of it was made and it was found to contain by weight over 90 per cent. volatile substance (a petroleum distillate). Reference to the literature showed that in a study of occupational diseases in Ohio 5 to 10 per cent. of persons using cement such as this suffered from an industrial poisoning. As a result of this investigation changes were made in the fitting department and the number of headaches was reduced considerably, although not to the extent that had been expected.

Eye examinations were next made and a number of workers with greatly impaired vision were found. They were referred to a specialist with whom the Company had made special arrangements; the cost of the examination and the correction were met by the employee.

A study was also made of dysmenorrhea, and absenteeism from this cause has been reduced to a minimum.

The medical department has succeeded in reducing the frequency rate of absenteeism 30 per cent., and the severity rate 25 per cent. Loss in production due to absenteeism before the establishment of the department was 13.5 per cent. Through the efforts of the department it has been reduced to 7.7 per cent.—a reduction which represents a saving of approximately $50,000 in one year.—M. C. S.

TEACHERS' HEALTH AS A RESULT OF TRAINING AND OCCUPATION. *E. D. Fleming. Nation's Health, Aug., 1925, vol. 7, pp. 519–522.*

A questionnaire on the subject of teachers' health was sent by the Bureau of Education at Washington, D. C., to state superintendents of education, superintendents of city schools, and principals of teachers' colleges and normal schools. It was learned that while millions of dollars

are spent annually on the health of schoolchildren, practically nothing is spent to conserve that of the teachers. The author considers that the teachers' training schools are at fault in their failure to stress the value of health and to train the teachers to demand enforcement of the few laws existing for their benefit.—E. S. C.

INDUSTRIAL DANGERS FOR PREGNANT WOMEN. *M. Hirsch. Zentralbl. f. Gynäk., Aug. 8, 1925, vol. 49, p. 1793.*

THE DANGERS WITH RESPECT TO PREGNANCY AND CHILDBIRTH FOR WOMEN EMPLOYED INDUSTRIALLY. *Berlin Letter, Jour. Am. Med. Assn., Sept. 12, 1925, vol. 85, p. 840.*

In a recent address on the subject of the disadvantages with regard to pregnancy, birth, and childbed resulting for women employed industrially, Dr. M. Hirsch recently presented the following data:

Until it will be possible to free all pregnant women (married or unmarried) from the disadvantages of industrial work, the following minimal requirements should be recognized and adopted: (1) prohibition of industrial work, on the part of pregnant women, for the last three months of pregnancy; (2) limitation of industrial work by pregnant women in the fifth and sixth months of pregnancy to four hours a day at the most, and in the third and fourth months of pregnancy to six hours a day, with two hours' rest at noon; (3) remuneration, for the loss of wages, from state funds or from some form of obligatory mutual insurance.

As prophylactic measures for pregnant women the following suggestions were made: (1) provision of seats in connection with forms of work that require an uninterrupted standing posture or constant walking about; (2) provision of a pleasantly furnished rest room in large industrial plants where women, not only during the rest periods but also in case of weakness or temporary incapacity, may have an opportunity to lie down on a comfortable couch; (3) provision of medicaments that medical experience has shown to be beneficial in pregnancy; (4) provision of canteens for supplying extra provisions, delicacies, beverages, and other articles that meet the special needs of pregnant women; (5) employment of factory physicians; (6) establishment of medical consultation hours for pregnant women in large industrial plants; (7) employment of women physicians as industrial superintendents, with the obligation of devoting special attention to pregnant women and making a special study of the effects of industrial work on the body and the mental and psychic life of women during the period of pregnancy; (8) obligation of the women superintendents to give special time and attention to pregnant women in connection with the labor processes; (9) creation of medical consultation centers for pregnant women in the communes; (10) absolute recognition of pregnancy discomforts as sickness within the meaning of the federal health insurance system as exemplified by the *Krankenkassen*, or health insurance societies; (11) obligation of *Krankenkassen* to assume the expense of medical treatment and the furnishing of medicaments to the families of insured married persons; and (12) assumption by the *Krankenkassen* of the hospital expense of a normal as well as a difficult confinement, with a proper per diem allowance.

REST FOR WORKING MOTHERS. *Jour. Am. Med. Assn., Sept. 19, 1925, vol. 85, p. 912.*

Chile recently passed a law which provides that every working mother must have a period of rest of forty days before and twenty days after childbirth, and that her position be held for her during this period. The law requires also that factories provide nurseries for the babies of working mothers and that free periods during the day must be granted for mothers to nurse their children.—K. R. D.

SAFEGUARDING THE HEALTH OF THE WOMEN IN INDUSTRY. *C. T. Brown. Nation's Health, Sept., 1925, vol. 7, pp. 626–627.*

The author describes the measures taken by the Prudential Life Insurance Company of America, Newark, N. J., to conserve the health of their women employees. The hours of work are short, 8:30 until 4 o'clock, with an hour at noon and half-holiday on Saturdays. The Company furnishes a hot nourishing lunch, maintains a recreation room and infirmary, and stimulates interest in athletics. There are rest periods morning and afternoon, in an attempt to break the monotony of routine. Under such conditions as these, attendance records are admirable and the women are probably benefited rather than injured by their work.—E. S. C.

SHOULD RETARDED CHILDREN LEAVE SCHOOL FOR WORK. *M. E. Roach. Nation's Health, Aug., 1925, vol. 7, pp. 539–541.*

Children between the ages of 14 and 16 who work may do so, in Illinois, only when certificated by schools. To gain a certificate a child must pass a physical examination, which is repeated whenever he changes his job. A slight gain to the community is thus effected because these children are led to remedy physical defects. However the conclusions of the investigator are that 95 per cent. of retarded children working are capable of making further progress in school if given a chance, and that children starting to work under the present conditions are not better off at work and do not make progress in the industrial world and are merely added to an already overlarge army of incompetents. There was evidence that the majority of these children went to work at 14 not because of the crying need of their families, but because of the survival among our foreign-born population of the idea that as soon as permitted by law children should contribute to the family budget.—E. S. C.

A KINDERGARTEN-NURSERY PROJECT RUN BY INDUSTRY. *S. P. Moore. Nation's Health, Sept., 1925, vol. 7, pp. 613–615.*

One feature of the industrial welfare program of the Kellogg Company, Battle Creek, Mich., is a kindergarten-nursery for the children of working mothers. Children, admitted on recommendation of the director of personnel, are cared for in two shifts, from 7 in the morning till 3 in the afternoon, and from 3 until 7. All children have regular physical examinations, oral hygienic care, play in the sunshine at stated intervals, one well-balanced meal, and one supplementary luncheon. A continuous individual record of the child and its progress is kept.—E. S. C.

INDUSTRIAL SANITATION: FACTORY CONSTRUCTION, ILLUMINATION, VENTILATION, HEATING, WATER SUPPLY, SEWAGE DISPOSAL

DRY AIR FILTERS. *S. E. Dibble. Jour. Am. Soc. Heating and Ventil. Eng., Aug., 1925, vol. 31, pp. 411–414.*

This is a brief discussion of apparatus used and results obtained in the testing of dry air filters. The author

recommends that a code for testing such filters be adopted so that tests can be made with standardized instruments.—P. D.

Deciding Factors of Adequate Ventilation. *W. J. McConnell. Jour. Am. Soc. Heating and Ventil. Eng., July, 1925, vol. 31, pp. 367–370.*

The author emphasizes the significance of temperature, humidity, and air movement as the deciding factors of adequate ventilation. The article is a summary of experimental facts discovered by the American Society of Heating and Ventilating Engineers in co-operation with the United States Bureau of Mines and the United States Public Health Service. Abstracts of this investigation have appeared in previous issues of This Journal.—C. P. Y.

Factory Ventilation and Industrial Tuberculosis. *C.-E. A. Winslow. Jour. Am. Med. Assn., Sept. 26, 1925, vol. 85, pp. 968–973.*

This article is a review of the general problems of factory ventilation and of the special and peculiar ventilation problems created in factories by the presence of toxic fumes and injurious dusts. Especial emphasis is laid on the striking statistical relation between the tuberculosis death rate and exposure to the inhalation of silicious dusts.—K. R. D.

INDUSTRIAL MEDICAL SERVICE: MEDICAL DISPENSARIES AND HOSPITALS IN INDUSTRIAL PLANTS

Principles of Industrial Health Work. *L. H. Frechtling. Hosp. Management, April, 1925, vol. 19, pp. 66–70.*

This is an account of the health service work in the paper mills of The Champion Coated Paper Company, Hamilton, Ohio. In this study the author subdivides the work into five classes of health service: medical, surgical, dental, nursing, and sanitary.

The medical department classifies all the men and women examined into four classes: Class A, those with no physical defects; Class B, those with defects so slight as not to make them a hazard on any job; Class C, those with defects great enough to necessitate certain limited work; Class D, those rejected—comprising 2.5 per cent. of the 8,395 examined by the department, a percentage which is reducible on reexamination. The surgical and medical departments are operated as a unit. Dental service covers both prophylaxis and first aid. The nursing service employs two nurses: the intramural nurse who assists with first aid, keeps records, and assists in the educational work of the department; and the visiting nurse who goes into the workers' homes. A sanitary corps supervises the cleaning of the plant, ventilation, lighting, and drinking water supply.—B. A.

The Medical Work of the General Electric Company, Oakland Mazda Lamp Division. *N. G. Smith. Alameda County Pub. Health News, April, 1925, vol. 3, pp. 26–28.*

All applicants for employment are first interviewed by a full time nurse. Those who are found to be fit are sent to the foreman in need of help for private conference. Applicants accepted by him are sent to the nurse for further oral medical examination. Eyes are tested, hearing checked, nutrition noted, hemoglobin taken, previous illness charted, history of exposure to tuberculosis, vaccination and early fevers recorded, together with weight, height, and age. Finally the applicants are referred to the medical adviser who is in attendance three days a week for examination of the heart, lungs, and blood pressure. Rejections, if any, are temporary, and the applicants are put in a hopeful frame of mind. The part time physician does not undertake to care for any patients; they are referred to their family physicians or to a specialist. There is also a part time dentist who examines all applicants, but as in the case of the part time physician he does none of the dental work required; he simply refers the applicant to his own dentist.

Periodic examinations are made by the medical adviser. Injuries are given first aid treatment, sometimes are cared for at the plant, and sometimes referred to the family physician. Undernourished workers are given a glass of milk and a graham cracker twice a day.—M. C. S.

HOSPITAL SAVES WORKERS $100,000. *Hosp. Management, May, 1925, vol. 19, p. 69.*

Prior to the establishment of the hospital department of the Marion Steam Shovel Company, Marion, Ohio, which was started ten years ago, 10 per cent. of the diseases contracted by employees were the results of wounds infected because of neglect. The ratio of infected wounds among employees has now decreased to 0.5 per cent. of those treated at the hospital, according to the physician in charge. This has been accomplished by obliging each employee who suffers even the slightest injury while at work to fill out a hospital card. When discharged a record of the case is made and the worker loses no time as far as his wages are concerned. The hospital takes care of from seventy-five to 100 cases every day, most cases being very slight. It consists of a large operating room, an X-ray room, an anteroom, the doctor's private office, and a women's room. In the equipment of the operating room is a large magnet for extracting steel splinters imbedded in the body.—B. A.

INDUSTRIAL PERSONAL AND COMMUNITY HYGIENE: HOUSING, ETC.

THE HOUSING SITUATION IN THE UNITED STATES. *Internat. Labour Office, Studies and Rep., Series G (Housing and Welfare) No. 2, 1925, pp. 52.*

This report is concerned for the most part with the general housing situation. There is, however, a short section (pp. 28–30) devoted to housing by employers, in which reference is made

to the housing arrangements of the American Woolen Company, the Dennison Manufacturing Company, the Carnegie Steel Company, and the oil and manufacturing concerns of Bayonne, N. J., such as the Standard Oil Company, Tide Water Oil Company, Babcock and Wilcox Company, Pacific Borax Company, International Nickel Company, American Radiator Company, who have entered on a joint plan to be carried out by the Bayonne Housing Corporation.—M. C. S.

INDUSTRIAL PSYCHOLOGY AND INDUSTRIAL MANAGEMENT IN ITS HEALTH RELATIONS

THE HUMAN FACTOR. *Published by the Massachusetts Society for Mental Hygiene.*

This new bulletin of the Massachusetts Society for Mental Hygiene is published quarterly and is concerned largely with the everyday problems of industrial relations. Its purpose is "to bring the principles of mental hygiene into the everyday life of business and industrial institutions and to make positive and definite contributions to the health and happiness of workers."

SPEED VERSUS ACCURACY IN THE DEVELOPMENT OF INDUSTRIAL SKILL. *G. C. Myers. Jour. Personnel Res., May, 1925, vol. 4, pp. 20–22.*

The author reviews some school experiments that show how wasteful it is to place too early emphasis on speed. Experiments under industrial conditions are needed to determine whether here also it is not economical in the long run to stress accuracy at the start.—M. C. S.

HINDRANCES TO OUTPUT. *Jour. Nat. Inst. Indust. Psychol., July, 1925, vol. 2, pp. 291–299.*

In a public discussion on this subject by the investigators of the National Institute of Industrial Psychology it was pointed out that piece rate systems were often defective; *e.g.*, at one large factory a standard was set which limited the workers' earnings to a certain sum per week, and in consequence, though some of the workers could earn well beyond the limit, they made no attempt to do so. Time rates are defective if they take no account of the quantity of work done when the workers differ greatly in capacity, for the best workers sometimes turn out twice as much work as the worst ones. In some factories no encouragement is offered to the workmen to suggest improvements, and in one instance, in which a foreman invented a mechanical device, he received no reward, the device being patented in the manager's name. Again, output is often reduced because of lack of tact on the part of foremen. The men will "get their own back" from a bullying type of man by deliberately taking things easily or by spoiling work. Management is often defective; *e.g.*, at two collieries every man had the right of calling personally on the manager to make complaints, and they received sympathetic treatment, but at a third colliery they were received brusquely, and made to realize their inferiority of status. It was agreed that though there was no

direct evidence that the trade unions gave official support to the policy of "ca' canny," they set their face against piecework, and the workers themselves frequently practised "ca' canny" on their own initiative. It was felt that the greatest essential of today was that a square deal should be given in industry.—H. M. V.

RESEARCH IN SELECTION OF MOTORMEN: PART I. SURVEY OF THE LITERATURE. *M. S. Viteles. Jour. Personnel Res., July, 1925, vol. 4, pp. 100–115.*

This article summarizes the published reports of research in America, Germany, France, and Belgium in the selection of motormen, and thus prepares the way for two succeeding articles descriptive of experimental work which has extended over a period of five years.—M. C. S.

VOCATIONAL TESTS IN THE ENGINEERING TRADE. *M. Tagg. Jour. Nat. Inst. Indust. Psychol., July, 1925, vol. 2, pp. 313–323.*

Tests have been constructed for the innate abilities which go to make up the personality of a good engineer. The tests employed were used for indicating ability in draftmanship, turning, fitting, pattern making, machine operating, and toolmaking. It was found that few of the standard tests of the psychologic laboratory are valid in vocational guidance and selection, for they mostly give very low correlations with the practical abilities which they are employed to test. The tests selected were applied to 126 subjects, and they consisted of (*a*) inverse drawing test, *i.e.*, making a drawing of the inverse of a simple diagram: correlation coefficients of 0.42 to 0.82 were observed; (*b*) cube building (Link): this gave coefficients of 0.57 to 0.72; (*c*) form board test, or fitting triangular pieces of slightly different size into the corresponding holes in a board: this gave coefficients of 0.83 to 0.86; (*d*) form building, or fitting together four pieces of metal of various shapes and sizes so as to form a rectangle: this gave coefficients of 0.42 to 0.72; (*e*) strip building, or fitting into a shallow tray pairs of pieces which just make up the width of the tray: this gave coefficients of 0.54 to 0.72; (*f*) drilling machine test, which consisted in "spotting" the center of a circle with a needle placed in the chuck of a drilling machine: this gave coefficients of 0.43 to 0.70; (*g*) slide rest test, or ability to trace a simple diagram by working the screws of a slide rest: this gave coefficients of 0.39 to 0.62. Also a divided attention test and an assembly test were employed. The general intelligence was tested by some of the well-known tests, and the physique by medical inspection. The temperamental disposition was determined by a personal interview, in which the candidate was first asked to write answers to questions concerning home life, work he liked best, etc.—H. M. V.

THE PSYCHOLOGICAL ASPECT OF RAILROAD INJURY. *B. R. Tucker and R. F. Gayle. South. Med. Jour., Aug., 1925, vol. 18, pp. 581–584.*

The psychologic aspect of injury to a railroad employee begins a long time before the accident or injury. It would indeed be economical, from several standpoints, for the railroads to have each of their employees physi-

cally and neurologically examined before he is put on the payroll. Were this done many suits for damages caused by a traumatic neurosis could be avoided. A routine Wassermann test should be made, for syphilis wounds heal slowly and disability later may be claimed from the accident which rightly belongs to syphilis of the viscera or central nervous system. A differential diagnosis must be made between malingering and functional traumatic neurosis based upon compensation; the difference between the two being that malingering is a conscious assumption of symptoms for the conscious purpose of gaining compensation, while a functional traumatic neurosis is a subconscious assumption of symptoms with a subconscious desire for compensation.

The authors' experience with railroads is that the railroads desire in every way to be just to their injured, that they are frequently overgenerous in their offers of compensation, that their early records are often incomplete, that their court cases are not fought, at times, with the proper vigor, that as a rule they are imposed upon by the awards of the juries, and that frequently not enough attention is paid to the neurologic and psychologic aspect of the case.—B. L. G.

INDUSTRIAL SERVICE AND MUTUAL BENEFIT ASSOCIATIONS

EMPLOYES' RECREATION IS EMPHASIZED. *N. J. Harkness. Hosp. Management, May, 1925, vol. 19, pp. 66–68.*

The Brunswick-Balke-Collender Company has built at its Dubuque factory a recreation building on land adjoining the plant. The first floor is occupied by the girls' rest room and restaurant, reception and lounging rooms, and by six billiard tables and four bowling alleys. The second floor is used as an auditorium, dance hall, and banquet room. The Company leases the billiard, bowling, restaurant, soft drink, candy, and tobacco concessions in the building to a man known as the manager, who is responsible for its proper upkeep, for supplying satisfactory meals, and in general for the successful operation of the recreation equipment. The factory mutual benefit association, in addition to its sick and death benefit funds, functions through its committees in the recreation activities of the employees, such as the dances, the factory newspaper, the band, billiard and bowling tournaments, outdoor sports, etc. The plant manager attests the practicability of the recreational plan in the following words: "We have had very little labor trouble since the recreation department has been in operation."—B. A.

RELIEVING STRAIN THROUGH PLAY. *M. B. Brodke. Alameda County Pub. Health News, April, 1925, vol. 3, pp. 8–10.*

Miss Brodke, director of the industrial activities of the Recreation Department of Oakland, Calif., tells briefly of the service which this Department has been able to perform for industry during the last five years

through its Industrial Athletic Association. This Association embraces a membership of thirty-five of the larger industrial plants of the city and reaches approximately 5,000 workers. Recreational programs are arranged for the worker's noon hour and for his leisure time. Employers and employees voice the opinion that the Association has created a better spirit of fellowship and has done much to improve the physical and mental health of the workers. There has been a great decrease in labor turnover and in absenteeism.—M. C. S.

PHYSICIAN AND BENEFIT ASSOCIATION IN INDUSTRY. *O. A. Cannon. Canadian Med. Assn. Jour., June, 1925, vol. 15, p. 619.*

A LUNCH ROOM WHERE EMPLOYEES CAN COOK THEIR OWN MEALS. *Nation's Health, Oct., 1925, vol. 7, pp. 708–709.*

The Edison Electric Illuminating Company of Boston provides an electrically equipped and attractively decorated room where its women employees may cook their lunches.—E. S. C.

MALINGERING

TESTS FOR VISION MALINGERING. *V. T. Holland. Hosp. Management, May, 1925, vol. 19, p. 69.*

The tests adopted to detect malingering by the New York City office of the New York State Department of Labor are given. Most important is the use of a high convex lens of 10 or 20 diopters placed before the good eye and a low concave lens placed before the other eye, thus leading the man to suspect that he is using his good eye only for the test. It is impossible for him to see anything with his good eye with a lens of 10 diopters before it. Other tests are: the use of a very high prism so placed that it produces a vertical diplopia; the use of complementary colors, red and green before each eye, in the ordinary Snellen test for malingering, the letters on the chart being also red and green and the colors neutralizing each other; the bar-reading test for close work.—B. A.

INDUSTRIAL HEALTH LEGISLATION: COURT DECISIONS: WORKMEN'S COMPENSATION AND INSURANCE

SOME ACHIEVEMENTS OF INDUSTRIAL LEGISLATION AND HYGIENE. *T. Oliver. Lancet, Sept. 19, 1925, vol. 2, pp. 630–632.*

This is an address delivered to the Congress of Industrial Hygiene, held at Amsterdam, September, 1925.

Some results of industrial legislation are here set forth, particularly in the coal mining industry of Great Britain where the first Act of 1842 was followed by a reduction in accident mortality from 5.2 per thousand employed in the period 1851 to 1855 to 1.3 per thousand in 1911 to 1920. In other countries reductions have also been brought about, but are not so pronounced. Prevention of explosions

has been mainly the cause, based on an understanding of how explosions originate and spread. On the other hand, preventive measures such as water spraying may favor the spread of ankylostomiasis as occurred in Westphalia between 1896 when there were 107 cases and 1902 when there were 1,355. Coincident with advancing legislation the general mortality of miners has greatly improved.

Legislation has abolished phosphorus necrosis by prohibiting the use of yellow phosphorus in the manufacture of matches, and has greatly lessened plumbism by strict control of lead industries. By restricting the use of arsenical pigments in wall-papers the house dweller has been protected against arsine poisoning.

New methods of silvering mirrors and of vulcanizing rubber have eliminated risks of mercurialism and poisoning from bisulphide of carbon.

Advances in industrial hygiene made in one country have been adopted in others; the cause of international brotherhood has thereby been promoted.—E. L. C.

INDUSTRIAL TOXICATIONS UNDER WORKMEN'S COMPENSATION ACT. *W. C. Givens. Canadian Med. Assn. Jour., May, 1925, vol. 15, p. 512.*

EQUALITY OF TREATMENT FOR NATIONAL AND FOREIGN WORKERS AS REGARDS WORKMEN'S COMPENSATION FOR ACCIDENTS. *Communications from Governments on the Proposed Draft Convention and Recommendation Provisionally Adopted by the Sixth Session of the International Labour Conference. (Final Vote.) Internat. Labour Office, 1925, pp. 19.*

REPORT ON WORKMEN'S COMPENSATION. *Internat. Labour Office, 1925, pp. 199.*

SUPPLEMENTARY REPORT ON WORKMEN'S COMPENSATION. *Internat. Labour Office, 1925, pp. 62.*

These reports contain the replies of the different countries to the questionnaire sent out from the International Labour Office, a general survey of the question in the light of these replies, and conclusions and texts of two proposed draft conventions and two draft recommendations.—M. C. S.

ESTIMATION OF PERMANENT DISABILITY IN INDUSTRIAL ACCIDENTS. *H. H. Kessler. Nations' Health, July, 1925, vol. 7, pp. 465–467, 516.*

Rational appraisal of industrial accidents takes into consideration vocational, economic, and functional loss. The most practical and equitable method is measurement of functional loss, which is achieved by use of the arthrometer for measuring movements of joints, and the dynamometer for measuring the condition of possible movement, power, and innervation (agility or dexterity) of the muscles. The medical examiner should stand as arbitrator between the employer and the employee.—E. S. C.

REHABILITATION OF DISABLED EMPLOYEES

OCCUPATION AND TUBERCULOSIS. *J. E. Chapman. Jour. Roy. San. Inst., 1925, vol. 46, pp. 119–126.*

The position is accepted that sanatorium patients after discharge often break down on reentering civil life, on

account of home and industrial environment. The ideal procedure would be to use village settlements where, under medical supervision, employment can be followed proportional to physical capacity and previous skill. Difficulties in the way of action are discussed. Then a sketch is given of the "Altro" workshop in New York, started in 1915; of the "Factory in the Fields" organized five years ago in Leeds; and of the workshop of the "Spero-Leather Workers" established in 1923. In each scheme, occupational requirements are subordinated to medical needs. Employment schemes of this kind under skilled management may just become self-supporting; but, if they are run without incurring any considerable loss, they should be considered successful, since against any financial deficit must be set the gain in prolonging and saving lives.—E. L. C.

A Working Colony for the Tuberculous. *J. Johnstone. Jour. Roy. San. Inst., 1925, vol. 46, pp. 127–128.*

A short description is given of the Hairmyres Colony in the county of Lanark. Here industrial workshops were opened in October, 1923, where men are trained as motor mechanics, cabinet-makers, boot repairers, and basket-makers. There are also outdoor departments for market gardens, forest nursery, poultry farming, and pig keeping. All trainees must promise to stay one year, and after the first month they are paid £5 a week. After training, the trainees have to be settled in civilian life. The opinion is expressed that the results will be excellent, and worth the time and expenditure involved.—E. L. C.

The Settlement Scheme in the Treatment of Pulmonary Tuberculosis. *J. B. McDougall. Jour. Roy. San. Inst., 1925, vol. 46, pp. 128–129.*

The Settlement Scheme of the Wooley Sanatorium near Hexham is here dealt with. A magazine is produced at the settlement. Fur and wool farming, by raising rabbits, is carried on, as well as pig farming. The Settlement has its own shop and boot repairing department, and also a section for wood working. The hotel was built entirely by patients, where they live on the dormitory system. The scheme is reported to be working well.—E. L. C.

INDUSTRIAL MORTALITY AND MORBIDITY STATISTICS

Tuberculosis Mortality and Industrialization. *G. Wolff. Abstr. as follows from Klin. Wchnschr., July 23, 1925, vol. 4, p. 1459, in Jour. Am. Med. Assn., Sept. 12, 1925, vol. 85, p. 859.*

Wolff shows with a large amount of statistical material that the tuberculosis mortality rate is considerably lower in densely populated, industrialized districts, such as England or Saxony, than in the much less highly civilized alpine districts of Bavaria and Austria and in the steppes of Hungary.—K. R. D.

ABSTRACT OF THE LITERATURE OF INDUSTRIAL HYGIENE

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GENERAL

INDUSTRIAL MEDICINE. *F. Koelsch. München. med. Wchnschr., May 22, 1925, vol. 72, pp. 867–870; May 29, 1925, pp. 911–913.*

This is a résumé of the literature on industrial medicine which appeared during 1924 and the early part of 1925.—M. C. S.

THE DOCTOR IN INDUSTRIAL MEDICINE. *E. F. Glaser. Calif. and Western Med., July, 1925, vol. 23, pp. 859–862.*

Industrial medicine is with us and has come to stay; every day the industrial physician or surgeon is coming to a more and more prominent position in the profession. Industrial medicine is not simply a field for the ordinary practice of general medicine and surgery; it is a development which in its broader sense includes preventive medicine. The industrial surgeon of today believes in and advocates physical examination of all applicants for work and the keeping of exact records of these examinations. The final test of this type of surgeon is the value of the service that he renders. The capacity of the industrial physician

to serve is measured by the man himself, his preparation, his vision, and, most of all, his attitude toward his job.—B. L. G.

INDUSTRIAL HYGIENE BY EMPLOYERS' ORGANIZATIONS. *F. L. Rector. Am. Jour. Pub. Health, May, 1925, vol. 15, pp. 423–426.*

Few organizations of employers have taken up the question of industrial medicine and hygiene to any extent. This paper sketches the work being done by the National Industrial Conference Board, an organization of some thirty-two national and state manufacturers' associations; this board works in connection with the Conference Board of Physicians in Industry, thus attempting to be a clearing house for information bearing on all general industrial medical subjects. The New England Conference of Industrial Physicians works along similar lines.—B. L. G.

THE RÔLE OF THE FEDERAL GOVERNMENT IN PROMOTING INDUSTRIAL HYGIENE. *W. S. Bean. Am. Jour. Pub. Health, July, 1925, vol. 25, pp. 625–629.*

The health activities of the federal government are carried on under two general clauses of the Constitution: the one granting the national government powers to make laws regulating commerce with foreign nations and among the states, and the other granting Congress power to levy and collect taxes, etc., for the common defense and general welfare of the United States. Health activities involving the police power have been left to the various states. The federal government has several agencies which are concerned with various phases of health work, but the chief burden falls upon the Public Health Service. The program and some of the studies of this Service are emphasized, particularly the work done on the effects on the body of exposure to high temperature, and also that done on the effects of some of the dusty trades on the employees engaged therein.—B. L. G.

OCCUPATIONAL DISEASES AND DANGERS, ESPECIALLY IN TEXTILE FACTORIES. *P. Sánchez Pérez. Gac. méd., México, May, 1925, vol. 56, pp. 112 and 106.*

THE FOURTH INTERNATIONAL CONGRESS OF INDUSTRIAL ACCIDENTS AND DISEASES HELD IN AMSTERDAM, SEPT. 8–15, 1925.

In 1910 in Brussels there met for the last time the International Congress of Industrial Diseases which used to have its Assemblies every four years and which therefore was due to meet in August, 1914, in Vienna. The outbreak of the war prevented that meeting, and since then the Congress has never been revived. This meeting in Amsterdam was to a certain extent an attempt to revive the former organization although it included industrial accidents. It would seem better to have these two subjects handled at different times, for they attract different classes of experts and it seems a poor plan to try to combine them.

The meetings in Amsterdam were held in the spacious building of the Colonial Institute and the members of the Congress were entertained by the Dutch people with a delightful hospitality which made up for the

bitter cold and persistent rain of that week. The program was good but, like all programs, too full, and there were too many short papers; on the whole, however, it was interesting to get a bird's-eye view of what had been going on in the field of industrial medicine in all these countries since 1914. Of course a great deal of valuable work has been done in the two fields of industrial dusts and industrial poisons, work of an experimental character as well as clinical observation, but not much of the former was reported at this Congress. K. B. Lehmann of Wurzburg, the greatest authority on industrial gases, gave a paper on the as yet unsolved problems in that field, namely, the relation of time and concentration to the action of poisonous gases; the effect of mixtures of gases; the influence of temperature and the influence of labor on the action of poisonous gases. He instanced the synergistic action of carbon monoxide and hydrogen cyanide; the fact that an amount of carbon monoxide which is tolerable at normal temperature becomes intolerable at higher or lower temperatures; and the experiments with carbon tetrachloride showing that exertion increases the toxic action probably by increasing the respiratory rate. It was depressing to learn that research in this famous laboratory has had to be suspended for lack of money.

Heubner of Göttingen gave a brief résumé of his studies on methemoglobin formation under the influence of nitrobenzene, aniline, and nitrous fumes, but for the most part the papers dealt only with individual clinical cases. Some of these were very interesting because of unusual origin or unusual symptoms. Floret, who is connected with one of the great dye works, reported a case of poisoning from phosphoretted hydrogen in acetylene gas, and several cases of acute benzine poisoning. One of these poisoned by benzine fumes was unconscious for two days, then developed symptoms typical of meningitis, then necrosis of the skin of the hip and thigh with fever and death after five weeks. Another, a young girl, became unconscious from benzine fumes, passing into a stage of excitement and delirium with epileptic convulsions. There is now a persistent *status epilepticus* with no such history nor history of hysteria before the accident.

One of those strange instances of susceptibility to small quantities of benzine was reported by Floret. This man was sent into a benzine tank which had been emptied four days before, filled repeatedly with boiling water and aired. Yet he died as if from an apoplectic stroke, and the condition of the body was like that following strangulation. Floret also reported a case of chronic benzene poisoning, with not only anemia and hemorrhages from the mucous membranes, but also extensive necrotic areas in the skin. Death was caused by the anemia. Floret finds, however, that certain operatives seem to experience a favorable effect when working with benzene; they have the appearance of blooming health and a blood count shows polycythemia. Evidently there is here a stage of stimulation of the hematopoietic tissues.

A case similar to one of Floret's was reported by Loewy of Prague, chronic benzene poisoning with necro-

sis of the upper jaw like phossy jaw, and general sepsis.

Koelsch, Chief of the Factory Inspection Department of Bavaria, told of cases of lead poisoning and also of hydrogen sulphide poisoning in furriers making "artificial chinchilla." Real chinchilla comes from China and is very expensive; the artificial is made from rabbit skins treated with lead acetate and ammonium sulphide. Hydrogen sulphide gives rise to affections of the eye in beet sugar refining and in artificial silk manufacture in Holland, according to Kranenburg. The anemia and leukopenia caused by radiation was studied by de Laet of Belgium who described two such cases in men working with soluble radioactive salts of uranium. A slighter effect was found in the men working with the insoluble salts. The red count was from 2,000,000 to 3,000,000 with marked morphologic changes, the white count 3,000 with a low proportion of polynuclears.

Teleky of Düsseldorf aroused a lively discussion when he insisted that one of the best and earliest diagnostic signs of lead poisoning was an inability to extend the wrist as far as normally and that the right hand in right-handed lead workers would show a greater loss of extension than the left. Lehmann, who has just finished an examination of more than 400 white lead workers, disputed this, saying that Teleky's test would be given by any middle-aged person who had used his right hand more than his left. This set the audience testing their wrist extensors and most of us found that Lehmann was right. Glibert of Brussels objected to the test that it is too easy for the worker to simulate and that it fails in men exposed to lead who are not working with their hands.

The most interesting discussion was on the subject of pneumonokoniosis, and it developed the difference of opinion which exists between the British-American group and the Continental group, Germany and Holland and Scandinavia, on the significance of free silica in industrial dusts. Collis gave a paper on inhalation diseases—that is, phthisis and asthma, the two specific diseases caused by dust. Asthma was described fifty years ago by Greenhow as caused by the dust from flax heckling and blowing and from the carding of cotton. It is a true spasmodic asthma, following exposure, and without acquired immunity, rather the contrary. Asthma does not kill, but cotton hecklers die more from bronchitis, pneumonia, and phthisis than do other cotton operatives.

With regard to phthisis, Collis traced it to the action of free silica expounding the view familiar to Americans on this point. The Continental opinion was stated by Sleeswijk of Delft. He admitted that the old view that the harmfulness of a dust depended on its sharpness was no longer tenable, but he held that it depends not so much on the presence of silica as on the absence of lime. Coal miners' phthisis, the English synonym for silicosis, has nothing to do with tuberculosis and the diagnosis of the latter must not be made unless the bacilli are discovered, which very seldom happens. In the Netherlands only six stone cutters out of 963 showed tubercle bacilli. Investigations in Germany with X-rays show

almost no tuberculosis among potters who are exposed to silica. The truth is that the fibrosis caused by silica is actually protective against tuberculosis.

In the discussion, Orenstein of South Africa said that the connection between silicosis and tuberculosis in the miners of the Rand was unmistakable. The purer the silica and the finer the particles, the greater the number of miners affected. There are at present 10,000 cases of silicosis drawing about £1,250,000 yearly in compensation. It seems to be a special type of pulmonary disease practically always going on to tuberculosis and proving fatal in two years' time.

Incidentally, I might state that this situation was brought to the attention of the Health Committee of the League of Nations at its session in October and that it was decided to send a commission of inquiry to the Rand; such a commission to include an expert on silicious dust and an expert on the bacteriology of tuberculosis, so that the inquiry would also include an examination of the strains of tubercle bacilli on the theory that a strain of unusual virulence may be found. These miners are not natives but Europeans, chiefly British.

The only American contribution was a paper on tetraethyl lead gasoline by R. R. Sayers of the Bureau of Mines which was read by F. D. Patterson of Philadelphia. It was too long to be read in full but aroused a great deal of interest. Certain side lights of the Congress were interesting for Americans. For instance, a study of the health of German printers laid stress on the high rate of psychosis in this occupation. German printers have a high suicide rate which is attributed to three peculiarities in that trade: first, the mental overstrain; second, the fact that the apprentices often come from the group of boys which has failed to pass the examination for the Gymnasium and is therefore hampered by a sense of failure and disgrace; and third, the social position of the printer which is between the working class and the middle class with a resulting emotional conflict.

The value of the Congress in Amsterdam was chiefly, as always, the opportunity that it gave to meet and confer with people from different places, and all the industrial countries, including Russia and excepting our own, were well represented. It is said that the next meeting will bring together only those interested in industrial medicine, not surgery, and it is to be hoped that the attendance from the United States will be more satisfactory than it was this time.—A. H.

SYSTEMIC OCCUPATIONAL DISEASES: OCCURRENCE, TREATMENT, AND PREVENTION

CENTRAL NERVOUS SYSTEM

INDUSTRIAL NERVOUS DISEASES. *O. Crouzon. Paper Read at Fourth International Congress on Industrial Accidents and Diseases, Amsterdam, 1925. Pamphlet Published by Nederl. Tijdschr. v. Geneesk., 1925, pp. 58–68.*

The etiology, general pathology, and medicolegal considerations of nervous diseases as they occur in industry are here considered. Attention is particularly directed to lead poisoning, mercurialism, arsenic, phosphorus, carbon monoxide, bisulphide of carbon, hydrocarbon compounds, and chlorides of carbon. While the facts are conveniently marshaled, no new points are brought to light. The author then refers to caisson disease, and the effects of high temperatures and traumatism. Occupational neuroses are only referred to in passing. French law today envisages only two forms of poisoning, lead poisoning and mercurialism. The author claims to have pointed out the gaps in French law in regard to occupational nervous diseases, and hopes that in consequence interest will be aroused and legislation revised.—E. L. C.

CIRCULATORY SYSTEM

THE HEART OF PERSONS ENGAGED IN HEAVY WORK. *E. Brezina. Abstr. as follows from Arch. f. Hyg., 1925, vol. 95, pp. 351–364, in München. med. Wchnschr., Sept. 4, 1925, vol. 72, p. 1535.*

Ordinary heavy work causes injury to the intact heart only when it is begun at too early an age or when it is resumed too soon after recovery from an infectious disease. Persons with pendulous heart are not suited for heavy work; they voluntarily avoid such occupations or automatically leave them promptly.—M. C. S.

PATHOLOGY OF THE CARDIOVASCULAR SYSTEM OF INDUSTRIAL ORIGIN. *L. Devoto. Paper Read at Fourth International Congress on Industrial Accidents and Diseases, Amsterdam, 1925. Pamphlet Published by Nederl. Tijdschr. v. Geneesk., 1925, pp. 79–82.*

Cardiovascular trouble may be of industrial origin due to changes resulting from manual labor or from the workers' habits which may be determined by their occupation. Industrial physicians have facilities for observing the slow onset of disease, which may originate from such direct causes as overfatigue and heavy physical strain; some workers, when exhausted, are particularly susceptible to electric currents. Cardiovascular trouble may follow from any direct cause, such as poisoning or infection which may act (*a*) rapidly, (*b*) in proportion to length of work, or (*c*) very slowly. Of each of these stages lead poisoning presents instances, depending on the amount of risk and the time of exposure. Generally arteriosclerosis due to lead takes twenty to thirty years to develop; it may or may not be associated with definite symptoms of poisoning. The conditions of work and the workers' own health are both important. Here outside influences, such as the alcoholic habit, syphilis, or other recent illness, exert their influence. Skilled treatment and rest may cure, while neglect after treatment may cause the trouble to return. Long periods of rest are particularly advantageous. Difficulty must always arise in determining the exact influence played by industry in causing cardiovascular trouble. Only by collecting and investigating statistics can the precise value of industrial risk be determined. Reliance has to be placed on majority statistics for this purpose. For those affected, suitable work must be planned, age being considered.—A. J. C.

POISONOUS HAZARDS AND THEIR EFFECTS: GASES, CHEMICALS, ETC.

THREE FATAL CASES OF INDUSTRIAL POISONING WITH ARSENIURETTED HYDROGEN. *H. Gerbis. München. med. Wchnschr., Aug. 14, 1925, vol. 72, pp. 1378–1380.*

This form of industrial poisoning is much commoner than physicians are aware of and often fails to be recognized and traced to its source. Arseniuretted hydrogen is formed wherever metals containing arsenic as an impurity are treated with acid with the production of nascent hydrogen; consequently the use of hydrogen in industry unless it is produced by electrolysis carries with it this danger, and hydrogen is thus produced in the chemical industry, in laboratories, for the filling of balloons, including toy balloons, for welding and cutting with the oxyhydrogen flame, in galvanoplating, pickling metals, and in the decomposition of impure calcium carbide and impure ferrosilicon.

The first two cases described by Gerbis were poisoned by hydrogen arsenide which was evolved by the contact of dilute sulphuric acid with iron. They were cleaning an iron tank car which had contained sulphuric acid and had been washed out till only a sludge with weak acid was left. The history of the first was as follows: A 48-year old man experienced in this sort of work did not wear a respirator but smoked a short pipe and did not notice any unusual odor while he was dipping the sludge in a pail. He felt ill at 11:30 and left the tank car while his helper finished the work without suffering any effect from it. The sick man was treated on the theory that he had breathed nitrous fumes. He was given oxygen inhalation and sent home under the care of a physician who saw him twice. The next day at 3 in the afternoon he was brought unconscious to the hospital with a history of having become much worse the night before, with repeated attacks of vomiting. He was very cyanotic, his pulse weak, 160 per minute, his lungs clear, there was no spontaneous micturition, and the catheter brought away a few drops of thick, dark red urine, evidently hemoglobinuria. A spectroscopic examination of the blood showed methemoglobin, no carbon monoxide. There was increasing dyspnea till 10 o'clock when he died. The autopsy showed dark red blood and bluish red discoloration of most of the tissues, dilatation of the heart, and inflation of the lungs. A diagnosis of poisoning by nitrous gases was made.

Gerbis' comment is that such a diagnosis is not justified in view of the absence of severe irritation in the respiratory tubes or edema of the lungs and in view of the evidence of hemolysis and hemoglobinuria. Methemoglobin may be caused by the action of nitrites but does not in itself speak for nitrous fume poisoning. It is, of course, not characteristic of arseniuretted hydrogen but cannot be taken as an argument against the diagnosis of this form of poisoning in view of the other evidence. Conclusive proof of the part played by arseniuretted hydrogen was furnished by the second case.

This man was doing the same work

but he wore a mask with a pipe supplying fresh air and worked for only an hour and a half. He did not feel ill until evening when he complained of apathy, abdominal pain, and diarrhea. By the following evening his skin was jaundiced, he passed dark brown, watery stools and scanty, dark red urine. He died that night. The autopsy was made in the Pathological Institute of the University and arsenic was recovered from the lungs. There was extensive jaundice of the skin and tissues, and hemolysis. The kidneys were swollen and dark, the liver markedly fatty with indistinct markings, the right heart and large veins filled with clotted blood.

The third case was of mysterious origin and not traced to arsine gas until a year after death. Neither clinical history nor autopsy report was as satisfactory as in the former two cases. The victim, a healthy workman of unusually powerful build, 55 years old, was employed in a potassium chloride works. For a short time one day he assisted a lead burner, lifting for him some heavy apparatus. Toward the end of the day he suddenly became ill, complaining of oppression in the chest and giving an impression of startling pallor, apathy, and confusion. Shortly after, burning pains in the throat began with increased difficulty in breathing, pains in the abdomen, and vomiting. The urine was described as brick red with a bluish shimmer and was scanty. The patient died early in the morning, death being preceded by extreme cyanosis and convulsions.

An autopsy was not made till four days later. It revealed no changes in the lungs which would point to poisoning from gases encountered in his usual work, such as nitrous fumes, chlorine, hydrochloric acid, or hydrogen sulphide, nor could the cause be found in any food the man had eaten. On the other hand, the history suggested arseniuretted hydrogen poisoning, and Gerbis believes that the source of the gas was the acetylene used by the lead burner to which the victim was exposed for a short time on the day of his illness. The acetylene was produced by the action of water on calcium carbide and, as is well known, when arsenic is present as an impurity in the latter it will be given off as arseniuretted hydrogen. During the war when impure materials often had to be used in Germany, it was found that acetylene gas might contain not only arseniuretted hydrogen but also phosphoretted hydrogen and hydrogen sulphide. It was not possible to prove that this particular calcium carbide had been contaminated with arsenic so long after the occurrence, but in view of the history of the case, the period of latency, the symptoms, the character of the urine, and the impossibility of finding any other form of poisoning, Gerbis believes that this should be considered an instance of arseniuretted hydrogen poisoning.—A. H.

A Case of Fibrous Myositis after Illuminating Gas Poisoning. *J. Jánossy. München. med. Wchnschr., May 29, 1925, vol. 72, p. 905.*

Jánossy gives the details of a case similar to that reported by Braun (see This Jour., 1925, vol. 7, Abstr. Section, p. 134), due to muscular hemorrhage.—M. C. S.

Carbon Monoxide. *Safe Practice Sheet No. 1, Nat. Safety News, July, 1925, vol. 12, p. 51.*

Hydrogen Sulphide. *Safe Practice Sheet No. 2, Ibid., Aug., 1925, p. 45.*

Chromium. *Safe Practice Sheet No. 3, Ibid., Oct., 1925, p. 63.*

This series of Safe Practice Sheets, prepared by the Industrial Poisons Committee, Chemical Section, National Safety Council, presents summaries of the present practice in the prevention of industrial poisoning.—M. C. S.

Lead Poisoning. *F. Koelsch and H. Ilzhöfer. München. med. Wchnschr., Aug. 28, 1925, vol. 72, pp. 1466–1467.*

The authors report two cases of lead poisoning in fur workers, one a man and the other a woman. The cause was traced to artificial chinchilla which is made by dyeing the skins of Russian rabbits. The skins are first put into a solution of lead acetate and then treated with ammonium sulphide. During this process hydrogen sulphide is generated and lead sulphide is precipitated on the fur. An examination of four skins showed a lead content of 0 to 4.62 gm. per 100 gm. of pelt. The higher the lead content, the darker were the skins. The two darker skins showed 4.26 and 4.62 gm. of lead per 100 gm. of pelt, the lighter colored skins, 0 and 2.44 gm.—M. C. S.

Experimental Lead Poisoning. *L. Scremin. Clin. med. ital., June, 1925, vol. 56, p. 244.*

Factory Regulations Where Lead Is Used. *Abstr. from Health, Commonwealth of Australia, May, 1925, vol. 3, p. 87, in Am. Jour. Pub. Health, Oct., 1925, vol. 15, p. 926.*

In this article a complete résumé is given of all the regulations to which a factory using lead must adhere except the certain factories exempted from these regulations.—B. L. G.

Effective Remedy in Metal Poisoning, with Special Reference to Lead. *S. T. Harris. Southwest. Med., May, 1925, vol. 9, pp. 183–184.*

The use of sodium thiosulphate is recommended for treatment of chronic metal poisoning of lead, zinc, and silver. Sulphur has a high affinity for most of the toxic metals, forming with them harmless compounds which are insoluble in the tissues of the body. Doses from 0.25 to 0.5 gm. have been used intravenously with good results. It can be used intramuscularly without local irritation. The tolerance for the compound is remarkable, the dosage limit being unknown, but 31 grains have been absolutely nontoxic. The drug is safe and positive in its action in the cases where it is indicated.—B. L. G.

Metal Founders' Fever in Russia. *J. Guelmann. Arch. f. Hyg., 1925, vol. 95, pp. 331–338.*

Guelmann describes the symptoms of founders' ague in thirty-eight cases observed in the hospital for occupational diseases in Moscow and discusses also the results of physical examination of 226 foundry workers. The thirty-eight founders all gave a history of former attacks although in two the symptoms were slight. Evidently immunity to this form of poisoning is rare, and when it appears may be due to especially good shop hygiene or poor

memory on the part of the worker. It is a question whether there is a difference in the reaction of the individual to metal fumes although Lehmann confirmed the fact that men whose exposure is interrupted suffer more than those who work steadily, showing a certain habituation to the fumes. This however does not show a real immunity.

Twenty-six of the men had their first attack soon after beginning such work—thirteen in the course of the first month—but four men had the first attack after thirteen years, twenty years, twenty-seven years, and thirty-five years. Some men suffer only when the fumes are heavy, others even when pouring small molds, and others are obliged to quit work because of oversusceptibility. Damp weather increases the trouble very much, partly by favoring the oxidation of the zinc fumes, partly because the particles collect droplets and form a heavy fog which is hard to get rid of by ventilation.

The attacks in these cases were of a typical character and usually accompanied by shivering and sweating but only a slight rise in temperature, if any. Eight had fever over 37.3°C. It was observed that a warm bath would often abort an attack, and men who came in for observation were not given baths for that reason. The observations made covered the following points: pulse, no important change; blood pressure, apparently unaffected; respiratory system, some dyspnea, feeling of pressure in the chest, paroxysmal cough, sometimes dark sticky sputum, but otherwise no objective change except hoarseness; digestive system, negative; blood, anemia and a tendency to leukocytosis; kidneys, no disturbance of function, neither albumin nor casts, but evidence of disturbed metabolism, for in twelve of twenty cases there was an increase in urobilin and in eight, indican; hematoporphyrin when looked for was almost always found, and in eight cases sugar was present. This is attributed to changes in the metabolism of glycogen rather than in the function of the kidneys because of the discovery of hyperglycemia in thirteen out of fifteen whose blood was examined. The blood sugar was present in quantities running from 0.126 per cent. to 0.199 per cent.; the quantity bearing no relation to the intensity of the ague. The belief that this increase is to be traced to injury to the liver was strengthened by the fact that four of the men showed enlargement of the liver, in one of whom the swelling was acute and disappeared when the attack passed over. Guelmann notes also that chronic enlargement of the liver was found in eleven of 111 brassfounders, while among 115 brass workers who did not do the actual pouring only two showed enlarged liver.

Guelmann declares his adherence to the theory of causation first enunciated by Lehmann, namely, that brassfounders' fever is a protein poisoning due to injury to the epithelial lining of the respiratory tract.—A. H.

THE EFFECT OF INSULIN ON TAR CARCINOMA IN MICE. *R. Münzner and F. Rupp. Abstr. as follows from Deutsch. med. Wchnschr., July 3, 1925, vol. 51, pp. 1113–1114, in München. med. Wchnschr., July 24, 1925, vol. 72, p. 1266.*

The authors' experiments confirm the observations of Silberstein and show that insulin tends to arrest the growth of the tumor.—M. C. S.

OCCUPATIONAL AFFECTIONS OF THE SKIN AND SPECIAL SENSES

A Case of Chlorine Acne. *Nicolas and Pillon. Bull. soc. franç. de dermat. et syph., July 7, 1925, pp. 33–36.*

This paper was read at the Eighteenth French Congress of Medicine, held at Nancy, July 16 to 19, 1925.

An Arab, aged 25, working in a hydrochloric acid plant, for two months only, suddenly developed a condition of acne. In the morning he manufactured the acid, in the evening he cleaned out the stills. His face, neck, ears, and forearms were heavily affected, and the scrotum, groins, shoulders, and chest more sparsely. On the exposed parts every hair follicle was blocked with a black plug and here and there were typical lesions of indurated or pustular acne. The man had previously never suffered from this complaint. These writers ask: Can it be caused by the inhalation of chlorine by the lungs or by its absorption by the stomach? The latter is negatived by its particular presence on exposed surfaces. They therefore attribute it to chlorine fumes. This origin is disputed by certain German investigators, and in the subsequent discussion of the paper Thibierge stated that the cause is still unknown.—R. P. W.

A New Affection from Modeling with Fortified Cement. *M. Baudouin. Bull. de l'Acad. de méd., Paris, 1925, vol. 94, pp. 869–875.*

Lime is one of the most common causes of dermatosis in industry. This dermatosis has long been known under the name of "cementers' itch." Occasionally cases have been reported of the ulcerations which this strong alkali causes. They have usually been found associated with friction. Instances have happened when men have been cleaning or scouring metals with a paste containing this material.

The writer of this article is a modeler and he required for his purpose a cement which would withstand the action of sun, air, and frost. He therefore tried a very fine kind of Portland cement. His finger tips soon became blanched and the skin thin. For some time he avoided this material. One day, in a hurry, he had to make a model of a delicate shellfish. He tried this cement again and worked for some hours without any discomfort. The same evening, however, the thumb and middle finger of the right hand and the index finger of the left hand became unbearably painful. Numerous small ulcers then broke out along the borders of these digits. It is these edges that the modeler uses to impress the fine grooves in any delicate work. Baudouin calls these the "typical sores of the modeler." They appear only when employing certain slow-setting kinds of cement. When this variety is being used, the hands always require to be protected with thin gloves, such as are worn by surgeons.—R. P. W.

THE QUININE IDIOSYNCRASY OF THE SKIN OF INDUSTRIAL WORKERS. *H. Dold. Arch. f. Hyg., 1925, vol. 96, pp. 167–171.*

In certain persons who are engaged in the manufacture of quinine and quinine preparations skin phenomena (urticaria, eczema) occur, for the most part on the exposed parts of the body, occasionally also (secondarily) on the genitals. These manifestations are caused chiefly by quinine dust and quinine preparations in powder form. In all probability the quinine exerts a direct irritating effect on the skin. There seems to be no preventive or remedy. Susceptible persons should avoid all contact with quinine preparations in powder form and should leave the work permanently.—M. C. S.

A REVIEW OF INDUSTRIAL OPHTHALMOLOGY. *M. P. Motto. Ohio State Med. Jour., July, 1925, vol. 21, pp. 488–491.*

In the year 1917 there were 700,000 industrial accidents reported, 8.3 per cent. of which were eye injuries. In 1910 there were six times as many blind persons as in 1850, with the population scarcely quadrupling in that period. With the exception of the last decade, each decade has shown an increase in eye accidents and in occupational eye diseases. The industry responsible for the largest number of eye accidents is the manufacture of iron and steel; mining, quarrying, handling of acids and chemicals, agricultural pursuits, etc., also are the cause of eye injuries in large number; infection is a large factor—in a series of 8,000 eye cases causing temporary disability due to foreign bodies, over 500 were attended by infection. Where the wearing of goggles has been made effective among the workmen, a marked decrease in the number of eye accidents has been shown; good tools, protection of machinery, wearing of helmets, instruction in handling chemicals and in first aid have also done much to cut down dangers. One of the greatest factors in the reduction of eye accidents has been the installation of efficient illumination.—B. L. G.

LANTERN SLIDES AND LECTURE MATERIAL ON EYESIGHT CONSERVATION. *Eye Sight Conservation Bull. No. 5, pp. 95.*

This pamphlet shows reduced illustrations of the lantern slides, accompanied by descriptive text and data, which can be purchased or rented from the Eye Sight Conservation Council, Times Building, New York City, for lecture purposes. The collection includes slides dealing with practically every phase of eyesight conservation for any audience.—M. C. S.

EYESIGHT CONSERVATION SURVEY. *Eye Sight Conservation Bull. No. 7 pp. 219.*

This volume condenses the results of an exhaustive study, comprising a summary of the literature of the field since 1914 and the results of original research and investigations conducted by the Eye Sight Conservation Council. There are chapters dealing with eye hygiene, eye diseases, eye defects, eyesight and education, eyesight and occupation, eye protection, and illumination.—M. C. S.

INDUSTRIAL PHYSIOLOGY: NUTRITION, METABOLISM, FATIGUE, ETC.

THE RÔLE OF PHYSIOLOGY IN THE TECHNICAL ORGANIZATION OF WORK. *M. Frois. Rev. d'hyg., May, 1925, vol. 47, pp. 385–407.*

The author emphasizes the importance of physiology in the scientific organization of work. The problems which he discusses are: influence of fatigue on efficiency; motion study; rhythm; rest pauses and the distribution of working hours; fatigue and accidents. The author favors the eight-hour day divided into two four-hour work periods by an hour's rest.—M. C. S.

INDUSTRIAL FATIGUE. *W. Pascual. Philippine Islands Med. Assn. Jour., June, 1925, vol. 5, p. 168.*

ON FATIGUE. *R. Allers. Paper Read at Fourth International Congress on Industrial Accidents and Diseases, Amsterdam, 1925. Pamphlet Published by Nederl. Tijdschr. v. Geneesk., 1925, pp. 90–93.*

Industrial fatigue is not a thing which can be expressed statistically merely in terms of production and of intervals required before the same effort can be repeated. There is the mental factor to be considered. Some persons experience fatigue more rapidly than others when work is monotonous. In the case of mental fatigue, strenuous exercise may be the true antidote, a fact which appears to be rather contradictory if fatigue is only considered as the result of muscular effort. The intelligence of the worker should be appealed to in order to avoid monotony; this may be done by interesting him in the work which he is doing and explaining its relation to the whole work of the establishment. Where processes are not particularly skilled, advantage may be gained by alternating work and so avoiding the clogging effect of constant repetition.—A. J. C.

ENERGY EXPENDITURE IN TYPEWRITING. *H. Ilzhöfer. Arch. f. Hyg., 1925, vol. 95, pp. 245–262.*

The author carried out two series of tests, one on a group of experienced typists and the other on himself during the process of learning to typewrite. In the first series tests were performed on four men and four women for a period of two hours. The findings were as follows:

The ventilation of the lungs increased about 30 per cent. during work.

During the first hour the amount of work performed was about 4 per cent. less than during the second hour, but the energy expenditure was about 12 per cent. greater.

In writing from dictation about 42.5 per cent. more work was accomplished in the same amount of time but with about 30 per cent. less energy expenditure to the work unit than in writing from copy.

Certain differences between the men and the women were noted: The breathing of the men was quicker and more shallow than when at rest; the breathing of the women was slower and deeper. The men did less work than the women, both from copy and from dictation, but they expended more

energy. It is quite probable that these were individual differences due to temperament, practice, etc. The number of subjects was too small to make any general statement possible.

The tests which the author carried out on himself showed that after twenty hours of practice the amount of work performed was two and one-half times as great as the amount done during the first experiment, but the energy expenditure was 79 per cent. less.

He accomplished 33 per cent. less work than the experienced typists in the same amount of time, but his energy expenditure was only 11 per cent. greater—that is, in learning to typewrite a rational method is acquired more readily than a good speed.—M. C. S.

HAZARDS OF COMPRESSED AIR, DIMINISHED PRESSURE, GENERATION AND USE OF ELECTRICITY, AND ELECTRICAL WELDING

Four Sudden Asphyxiations in a Caisson. *Abstr. from Ohio State Dept. Health, Feb., 1925, in Am. Jour. Pub. Health, Oct., 1925, vol. 15, p. 924.*

Four workmen suddenly lost their lives in a large building caisson which had been idle for some time. Death was due undoubtedly first to asphyxia and probably also to head injuries and broken necks from a fall of approximately 50 feet. It was found on analysis that caissons which were unused for some time showed an increase in carbon dioxide and a decrease in oxygen content.—B. L. G.

Death from Electric Current. *H. Schridde. Abstr. as follows from Klin. Wchnschr., Nov. 5, 1925, vol. 4, p. 2143, in Jour. Am. Med. Assn., Dec. 19, 1925, vol. 85, p. 2000.*

Schridde made postmortems on thirty-seven men who had been killed by electric currents of not more than 220 to 250 volts. He found in thirty-six of them typical signs of a "thymic constitution:" the lower extremities were long, the neck short, the skin frequently fine and pale and with only little hair, especially in the axillae, little or no beard, and a heterosexual or intersexual type of pubic hair. The thymus gland and spleen were enlarged. The only exception was one elderly man in poor general condition. Burns were not always present. In the positive cases they were on the left hand (shorter route to the heart) in 90 per cent. Therefore the old recommendation to keep one hand (the left) in the pocket while working was sensible. Edema of the lungs was present in twenty-one of his cases. The death in the remaining fifteen might be explained by fibrillation of the ventricle.—K. R. D.

HEAT, COLD, AND HUMIDITY

Some Effects of High Environmental Temperatures on the Organism. *F. B. Flinn. U. S. Pub. Health Rep., May 1, 1925, vol. 40, pp. 868–896.*

The effects of high environmental

temperatures on the blood tissue of the body were studied by exposing dogs for six hours, or less, to various temperatures ranging from 20° to 50°C. in a beaver board chamber 4 feet wide by 7 feet long by 7 feet high.

Observations made during exposure showed the following changes:

1. The rectal temperature fell in temperatures between 20°and 30°C. but rose 1° in six hours at 40°C. and very much faster in temperatures between 45° and 50°C.

2. No change was observed in the oxygen capacity of the blood that could not be accounted for by diurnal changes in hemoglobin and excessive evaporation of water.

3. The oxygen content of the blood did not change at 20° but dropped at 30° and increased slightly at 45° and 50°, although not in direct proportion to respiratory rate.

4. The alkali reserve remained unchanged at 20° and 30°, but fell sharply at 40° during the first four hours, followed by a gradual fall during the last two hours. At 45° and 50° there was a rapid depletion in alkali reserve.

5. The carbon dioxide content followed the alkali reserve changes.

6. The hydrogen ion concentration of the plasma remained unchanged at 20°, 30°, and 40°, and decreased at 45° and 50°.

7. The concentration of blood sugar fell at 20° and 30°. At 40° it fell during the first two hours, but rose in the next four hours. No change was observed at 45°, while at 50° there was a sharp rise.

8. The blood solids showed only the usual diurnal changes at 20° and 30°, but the concentration increased at 40°, 45°, and 50° without initial drop.

Air movement was found to benefit the organism at its own expense by delaying the effects of the high temperatures, while water drunk freely during exposure helped maintain the animals in normal conditions.—P. D.

WOMEN AND CHILDREN IN INDUSTRY

STANDARD AND SCHEDULED HOURS OF WORK FOR WOMEN IN INDUSTRY. A STUDY BASED ON HOUR DATA FROM 13 STATES. *U. S. Dept. Labor, Women's Bur., Bull. No. 43, 1925, pp. 68.*

The prevailing hour schedules as of Sept. 15, 1922, or the payroll date nearest thereto, are given for 162,792 women employed in 1,709 plants. More than one-third had a nine-hour day; one-fifth worked eight hours or less. The standards in the different states varied widely, however. In South Carolina over four-fifths worked regularly ten hours a day; in Georgia nearly one-third worked more than ten hours, and over one-third had a ten-hour schedule. The clothing industry and the textile industry showed marked differences in their hour policies; in the former eight to nine hours was most common, in the latter ten hours.

The Saturday afternoon holiday prevailed in factories; only four-fifths of laundry workers had a short Saturday; and three-fifths of those in mercantile and 5 and 10 cent stores had a longer day on Saturday than during the rest of the week.

A fifty-hour week was the standard for the largest group of women. One-third of all women had a scheduled week of forty-eight hours or less. In South Carolina a large majority worked

more than fifty-four hours a week; in Georgia and Alabama about two-thirds had a week of more than fifty-four hours.

Only 1 per cent. of the women included in the study had no regular lunch time or had less than thirty minutes. Very few night workers were employed. The largest proportion was in the textile industry and the most common schedule was eleven hours. For the most part employers adhered to the daily and weekly maximum permitted by law; there were, however, a few who maintained schedules in advance of the standard.—M. C. S.

HOME ENVIRONMENT AND EMPLOYMENT OPPORTUNITIES OF WOMEN IN COAL-MINE WORKERS' FAMILIES. *U. S. Dept. Labor, Women's Bur., Bull. No. 45, 1925, pp. 61.*

There were approximately half a million wives and daughters 15 years of age and over in the mining regions investigated, and more than a fifth of these were gainfully employed within or outside the home. Three-fourths of the bituminous mine workers as compared with less than a third of the anthracite mine workers were living in places sufficiently remote from towns and cities as to limit the opportunities for employment for women. This explains the higher percentage of women in the anthracite region gainfully employed (31.1 per cent.) as compared with the percentage in the bituminous regions (18.3 per cent.). It also accounts for the large proportion of daughters in families in the bituminous region who leave home to seek work.

The bituminous and anthracite sections showed a marked difference in regard to the proportion of dwellings equipped with running water—approximately 14 per cent. and a little over 80 per cent., respectively. A little over 20 per cent. of 80,210 dwellings in 811 communities had running water; about 3 per cent. had a bathtub or shower, and less than 4 per cent. inside flush toilets.

Only 0.4 per cent. of the company owned bituminous communities and 2 per cent. of such anthracite communities had sewerage systems with which every house was connected; 4.2 per cent. of the independent bituminous communities and 20.2 per cent. of the independent anthracite communities had complete sewerage systems.

In the bituminous and anthracite regions of the company controlled communities 66 per cent. and 27 per cent., respectively, of the dwellings had electric or gas lights; a little more than 81 per cent. of the independent communities in the bituminous regions and over 88 per cent. in the anthracite region had a public system of street lighting.

Mining camps distant from towns quite generally had made provision for doctors' services, and in some instances, for the services of a nurse; but all of the other institutions that are considered as playing an important part in American community life were lacking. They were absent also from many of the independent mining towns.

Very few company controlled mining communities had made provision for recreation suited to the women in the camp, whereas the majority of the independent communities provided such recreational facilities.—M. C. S.

INDUSTRIAL SANITATION: FACTORY CONSTRUCTION, ILLUMINATION, VENTILATION, HEATING, WATER SUPPLY, SEWAGE DISPOSAL

THE HYGIENIC CONDITIONS OF STOKERS ON MERCHANT SHIPS DRIVEN BY OIL. *C. Vigne and H. Cury. Office internat. d'hyg. pub., Bull. mensuel, Sept., 1925, vol. 17, pp. 979–989.*

A report is here presented which was undertaken to ascertain whether the introduction of oil fuel on steamers subjected stokers to any special risks. Such risks might be inherent: (1) in the new combustible—but the authors find that no danger to stokers occurs from gases evaporating from the fuel while the products of combustion are carried immediately to the funnels and so are of no moment; (2) in the way in which the oil is placed and stored on board—risk of fire and explosion compels efficient precautions being taken in the structure of the storage tanks which are cleaned out and filled while the vessels are in port by a trained personnel acquainted with dangers associated with any fumes which may arise; (3) in the method of use—the investigators contrast the work of charging furnaces with coal with that of oil, and are much in favor of the new fuel; all heavy, laborious work with exposure to radiant heat has been abolished, and whereas a stoker previously could feed only three furnaces, he can now easily supervise from twelve to eighteen; his work consists in little more than noting that the normal pressure is maintained on the manometers. Investigations into time lost on the steamship "France" before and after the introduction of oil showed that in twelve months before the change the percentage of shifts lost by stokers was 1.89, while after the change the percentage fell to 0.80. Other oil driven steamships show even better results, *e.g.*, on the "Paris" the percentage of shifts lost was 0.56, while on the "de Grasse" no time was lost during four consecutive voyages in 1925. The hope is expressed, in the interests of steamship stokers, that oil fuel will rapidly replace coal. The only danger associated with it is during the cleaning out of the tanks in port, and this can be guarded against.—E. L. C.

THE HYGIENIC PRINCIPLES OF VENTILATION TECHNIC WITH SPECIAL REFERENCE TO THE USE OF THE KATA-THERMOMETER FOR THE DETERMINATION OF COOLING POWER. *P. Weiss. Arch. f. Hyg., 1925, vol. 96, pp. 1–68.*

The author describes Hill's kata-thermometer and discusses its use. Tables containing experimental data are appended.—M. C. S.

THE HEATING OF ROOMS: A COMPARISON OF THE COSTS OF DIFFERENT METHODS ON THE BASIS OF WARMTH COMFORT. *M. Fishenden and R. E. Willgress. Fuel Res. Board, Tech. Paper No. 12. H. M. Stationery Office, 1925, pp. 48.*

This paper contains the results of an investigation into the relative costs of different methods of artificial heating on the basis of warmth and comfort. The experimental part is preceded by a thorough discussion on bodily comfort as affected by atmospheric conditions.

In the light of these experiments, hot water heating with a coke-fired boiler is the most economical method for heating small rooms. But for large rooms, fireplaces are more economical, especially when there are only a few people in the room.

This conclusion, of course, does not hold true in the case of schools and auditoriums where the occupants are evenly distributed over the floor area. In such places air heating must be resorted to.—C. P. Y.

INDUSTRIAL MEDICAL SERVICE: MEDICAL DISPENSARIES AND HOSPITALS IN INDUSTRIAL PLANTS

Dental Activities of General Electric Company. *F. E. Schubmehl. Nation's Health, Oct., 1925, vol. 7, pp. 700–701.*

The General Electric Company in its plant at Lynn, Mass., has equipped two dental offices at an expense of approximately $1,800 each. Members of the local dental society utilize the offices in rotation, fixing prices somewhat lower than in their private offices. The employees of the Company are not charged for the time spent in the dentist's chair.—E. S. C.

INDUSTRIAL PSYCHOLOGY AND INDUSTRIAL MANAGEMENT IN ITS HEALTH RELATIONS

Research in the Selection of Motormen: Part II. Methods Devised for the Milwaukee Electric Railway and Light Company. *M. S. Viteles. Jour. Personnel Res., Aug.–Sept., 1925, vol. 4, pp. 173–199.*

"The prime requisites of a street car motorman were studied on the job as well as in the laboratory by Dr. Viteles. In testing for the desired qualities, he found—in the preliminary investigation here reported—little correspondence between ratings of supervisors and scores on general intelligence tests or on standard personality tests. More promising results were obtained with a test devised to measure specific abilities needed in operating a car so as to avoid accidents and with an especially designed Judgment Test."—M. C. S.

Vocational Tests for Selecting Packers and Pipers. *W. Spielman. Jour. Nat. Inst. Indust. Psychol., Oct., 1925, vol. 2, pp. 365–372.*

In packing, it is quite usual for the output of girls who have had the same training and experience to vary by more than 50 per cent. These differences depend chiefly on "talent" for the work; tests were therefore devised for the selection of packers. The work consisted in transferring articles from the receptacle in which they came from the factory into containers of varying size. Each article had to be examined for flaws, and faulty articles rejected. They had to be packed tightly, in certain numbers and positions. Tests were employed for testing dexterity of fingers, hand and eye co-ordination, estimation of size, and

observation (*e.g.*, of errors in color, size, and pattern). These and other tests were also used for girls employed in piping confectionery articles. Thirty girls from each department were tested, and the correlation coefficient of the test ranking with the firm's ranking was $+0.86 \pm 0.04$ in respect of packing ability, and $+0.84 \pm 0.04$ in respect of piping ability.—H. M. V.

THE ASSEMBLY AND REPAIR OF GAS STOVES AND FIRES. *G. H. Miles and A. B. B. Eyre. Jour. Nat. Inst. Indust. Psychol., Oct., 1925, vol. 2, pp. 352–358.*

This investigation was made with a view to improving working conditions in workshops where men were engaged in assembling and repairing gas stoves. It was found that, in a group of twenty-five men engaged in repairing, several hours a week were wasted in delays caused by men borrowing tools from one another. This loss of time was avoided by providing each man with a complete set of tools. These tools were fitted into a carefully planned tool rack, instead of being left haphazard on the bench. The men lost 7 per cent. of their time in fetching stove parts and materials, so a lad with a truck was introduced, and he saved all but 2 per cent. of the wasted time. The stoves stood at floor level, and this involved so much stooping that the workers spent 40 per cent. of their time in positions involving an undue strain on their energies. This strain was greatly reduced by the introduction of an adjustable working table.

In the assembly of gas fires, which weighed, on an average, 91 pounds each, the men had to change the position of the fire 181 times a day, and lift it clear of the bench 49 times a day. A turntable was introduced by means of which the fire could be easily moved, and the previous strain was reduced to a fourth. The men had to fix the fire bricks by means of pegs, from which surplus cement had to be scraped away. By introducing a suitable tool, the time required for this process was reduced to a half. In the pegging process, which took one and one-half hours a day, the man had to lean over the bench, with consequent backache. By providing suitable stools, this discomfort was avoided. These and other causes of delay, which were similarly dealt with, had caused irritation in the men as they worked at piece rates, and so the introduction of improvements was warmly welcomed.—H. M. V.

INDUSTRIAL HEALTH LEGISLATION: COURT DECISIONS: WORKMEN'S COMPENSATION AND INSURANCE

CONDITIONS, ESPECIALLY PREVIOUS PATHOLOGICAL CONDITIONS, WHICH INTERFERE WITH RESULTS IN INDUSTRIAL INJURIES. *S. J. Hunkin. Calif. and Western Med., April, 1925, vol. 23, pp. 424–429.*

After illustrating his points with cases from his own experience, the author concludes:

> That previous conditions, arising out of earlier injuries or already existing diseases, may and often do materially modify results obtained after industrial injuries; that outside of osteo-arthritis and probably the

major fraction of even this, the most important cause for previously existent structural pathology of the working man lies in the long continued exposure to the elements, the faulty, ofttimes necessary, positions, the frequently repeated minor injuries occurring perhaps over a great many years. The last accident is oftimes not the one important factor in the disability. Of right, the gradual using up and wearing out of a man in industry should be just as compensable as his breaking up. . . . . It is true that a little real malingering is being put over, but very little. It is true, however, that a good deal of exaggeration is being put over. Probably the chief cause for this is the feeling that telling the truth about the pre-existent and growing disability mitigates against compensation. If previous conditions ofttimes were accepted as evidence of a using up in industry and were made compensable, the great incentive for exaggeration would pass and a better era between the laborer and the employer would be inaugurated.

—B. L. G.

BASIS FOR ESTIMATION OF DISABILITY IN INDUSTRIAL ACCIDENTS. *L. S. Viramontes. Gac. méd., México, May, 1925, vol. 56, p. 51.*

DISADVANTAGES OF WORKMEN'S COMPENSATION ACT LEAD EMPLOYER TO BE LESS INTERESTED IN HEALTH OF EMPLOYEE. *W. L. T. Addison. Canadian Med. Assn. Jour., July, 1925, vol. 15, p. 728.*

FRACTURED NECK AND FEMUR AND COMPENSATION. *J. Akerman. Paper Read at Fourth International Congress on Industrial Accidents and Diseases, Amsterdam, 1925. Pamphlet Published by Nederl. Tijdschr. v. Geneesk., 1925, pp. 108–109.*

Professor Akerman gives an analysis of 270 cases of fractured femur with regard to compensation claims. Complete recovery occurred in fifty-six patients who were able to return to work without any disability; these were mostly patients under the age of 50 years. Loss of function in this injury inclines to be more permanent and serious for older patients. Restoration of function after treatment cannot be estimated under six months after injury. Tables are given displaying the amount of disability at various ages; this amount in bad cases may be as much as 75 per cent.—A. J. C.

WORKMEN'S COMPENSATION LEGISLATION OF 1925. *L. D. Clark. U. S. Month. Labor Rev., Oct., 1925, vol. 21, pp. 792–807.*

An analysis is given of the workmen's compensation legislation of twenty-eight states. The most noticeable trend is toward increased benefits. Of importance are the enactment of a new law in Missouri, and a proposed amendment of the constitution and a new law in Arizona. An amendment to the law of Alaska and the proposed law of Arizona make provision for medical and surgical aid. These two jurisdictions were the only ones lacking such provisions.—M. C. S.

REHABILITATION OF DISABLED EMPLOYEES

PHYSIOTHERAPY IN THE TREATMENT OF INDUSTRIAL INJURIES. *G. E. Barr. Abstr. as follows from Jour.-Lancet, May, 1925, vol. 45, pp. 212–215, in*

Jour. Radiol., Nov., 1925, vol. 6, p. 467.

Statistics gathered by some of the foremost authorities and verified to the satisfaction of the author prove that physiotherapy applied to industrial injury cases aids materially in their improvement:

1. Physiotherapy reduces the period of disability 30 to 40 per cent. and in some cases more.
2. The amount of total disability is reduced 30 per cent. or more.
3. Labor is conserved by putting the laborer back to work in a shorter period of time.
4. The injured skilled employee is restored to his maximum working efficiency, thus keeping production up to its highest point.
5. Good will is created between employee and employer.

THE FUNCTIONAL READAPTATION OF WORKERS INJURED AT THEIR TRADES. *A. Oller. Paper Read at Fourth International Congress on Industrial Accidents and Diseases, Amsterdam, 1925. Pamphlet Published by Nederl. Tijdschr. v. Geneesk., 1925, pp. 102–107.*

In Spain legislation has decided that reeducation must be undertaken for those who have been injured from their work. The matter is intricate, as it calls for collaboration between physicians, engineers, psychologists, and works' managers. The author considers that an institution where such work is carried out must aim at fitting the patient for a suitable occupation by means of physical exercises and, if necessary, orthopedic procedure; the whole being carried out in connection with instructional classes and workshops. Mere functional restoration is only one part of the work. By this means good results are being obtained and similar methods should be compulsory in all countries.—A. J. C.

THE DISABLED WORKER. HIS PLACE IN INDUSTRY. *L. Heyermans. Paper Read at Fourth International Congress on Industrial Accidents and Diseases, Amsterdam, 1925. Pamphlet Published by Nederl. Tijdschr. v. Geneesk., 1925, pp. 83–89.*

The tendency to be disabled increases with age. In recent years in most civilized countries longevity has been extended. Hence the problem of disabled workers in middle life is becoming one of increasing importance. Men in the fifties, if they lose their employment, experience great difficulty in finding other work, however willing they may be. Employers naturally tend to get rid of the old and feeble. The author calculates that 200 out of every 10,000 become disabled through such things as blindness, deafness, insanity, and epilepsy, in addition to accidents. These middle-aged workers, through their experience and their character, are often valuable, too valuable to place on the industrial dust heap. In America Mr. Ford has shown how work can be found advantageously to the employer for all such cases. A plea is put forward that in every district an organization should exist for finding work for such men, even if for only half a day; this would be better for them and for the community than supporting them out of community funds. Suitable work is even better for many than treatment by massage and passive movements.—A. J. C.

WORKSHOPS FOR THE TUBERCULOUS. *Lancet, Oct. 17, 1925, vol. 2, p. 815.*

The question of after-treatment for the tuberculous is discussed by Dr. C. H. Walmisley. He advocates the establishment of workshops which allow the patient to live at home and to go to work under conditions suitable to his disease. If, however, he did only six hours' work and received only six hours' pay, his family could not live on his earnings; on the other hand, if he was paid for a full day's work, the goods he produced could not be sold at an economic price. The suggestion is made that surplus funds under the National Health Insurance Act should be devoted to subsidizing the workshops. To take a patient from a sanatorium and let him sink in his way of life is the worst possible line of action.—E. L. C.

WORK FOR THE TUBERCULOUS. *Tubercle, Nov., 1925, vol. 7, pp. 96–98.*

Reference is made to good results obtained under a scheme of the London County Council to train postsanatorium cases for at least four hours a day at market gardening and various kinds of light work. Account is then given of a meeting at which an association was formed to advance occupational therapy for all varieties of illness having slow and tedious convalescence. The great value of short periods of manual work for such cases was accepted, in order to occupy the mind and expedite the restoration of function. Each industry should have its own workshop for the employment of its own tuberculous patients and other convalescents. Subsidy for factories for partially disabled would be required, but would be wise expenditure, since it would cost less than maintenance in idleness and would be the means of restoring many to productive health.—E. L. C.

OCCUPATIONAL THERAPY. *M. Gribble. Lancet, Oct. 17, 1925, vol. 2, pp. 838–839.*

After pointing out that no doubt exists as to the value of handwork as a means of physical and mental cure in cases where recovery is slow and tedious, that in practice and result occupational therapy differs widely in mental and physical illness, and that the need for trained workers is urgent, the author announces that a provisional committee has been formed to finance and organize efforts at promoting occupational therapy.—E. L. C.

ABSTRACT OF THE LITERATURE OF INDUSTRIAL HYGIENE

VOLUME VIII APRIL, 1926 NUMBER 4

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GENERAL

OCCUPATION AND HEALTH. ENCYCLOPAEDIA OF HYGIENE, PATHOLOGY AND SOCIAL WELFARE, STUDIED FROM THE POINT OF VIEW OF LABOUR, INDUSTRY, AND TRADES. *Internat. Labour Office, 1925.*

This encyclopedia is being issued for the purpose of bringing together all the information in the various countries concerning industries or processes which may be considered unhealthful. It is appearing in brochure form, several brochures being grouped together in a temporary cover. A volume edition is to be published as soon as the complete series of brochures has appeared.—M. C. S.

THE MEDICAL HAND IN MODERN INDUSTRY. *P. Howie. Lancet, Nov. 7, 1925, vol. 2, p. 1001.*

An abstract is given of an interesting address delivered at Aberdeen in which the history of industrial medicine is traced back to Hippocrates and Galen. The inception of preventive measures came with the industrial revolution and is ascribed to the activities of Dr. Perceval at Manchester in 1784, out of which emerged factory legislation which progressed on preventive lines throughout the nineteenth century. But a new element has now been introduced—industrial physiology, or the maintenance of

health. The value of this movement to efficiency and to the worker is coming rapidly to the front; it is growing on voluntary lines in close co-operation with the welfare movement which is partly voluntary and partly enforced by statutory requirements. A new outlook has thus been formed with which the workers should be made acquainted, but this can only be done through education and lectures which must be organized for the purpose.—E. L. C.

INDUSTRIAL HYGIENE. *H. G. Chapman. Med. Jour. Australia, Sept. 26, 1925, vol. 2, pp. 387–391.*

The importance of medicine to industry is discussed by Professor Chapman, who points out that measures must be employed to estimate the extent of ill health present in any industrial group exposed to some special risk. He gives detailed information of the amount of pneumonokoniosis among Broken Hill miners as ascertained by the Technical Commission of Inquiry in 1920. The results indicate that the percentage of men affected rose with length of employment. Two series of examinations are carried out: the first included 4,337 persons of whom 1,697 were miners using machine drills; and the second 6,538 persons of whom 2,618 were miners using drills. The investigation brought out clearly that if men had worked elsewhere before they came to Broken Hill, the percentage of pneumonokoniosis present was always higher than if they had worked only at Broken Hill. The disease, however, was found at Broken Hill to be confined to the miners. Other matters are also dealt with, but the interest of the article lies mainly in the data relating to Broken Hill.—E. L. C.

INDUSTRIAL HYGIENE. *W. E. Elliot. Jour. Roy. San. Inst., Nov., 1925, vol. 46, pp. 213–216.*

This presidential address points out the novelty of industrialism compared with previous ages. Up to a century ago the muscles of men and horses did the work; today each worker controls ten times his physical strength, but his nervous system is unaltered. Our great machines resemble prehistoric giant brutes with bodies too powerful for their brains. Data are quoted to show that all cases of sickness in the insured population of Scotland are slightly more for men than for women; but pneumonia is pronouncedly more for males; so are arterial diseases; eye troubles also are more; to the contrary stands anemia, which is far heavier for women. Here are problems to solve. Modern unrest indicates bad captainship. Betting is a reaction against monotony whether in industry or a garrison town. Industrial hygiene aiming at health rather than at illness, at the man and not at disease, has captured the imagination.—E. L. C.

A DEPARTMENT FOR INDUSTRIAL DISEASES. *Berlin Letter, Jour. Am. Med. Assn., Nov. 7, 1925, vol. 85, p. 1501.*

Through the action of the Prussian minister of commerce and industry, a department for industrial diseases has been established in the Empress Augusta Victoria Hospital in Berlin. Although Italy, two years before the war, established in Milan the clinic

for occupational diseases, under the direction of Professor Devoto, and also Soviet Russia has founded richly endowed institutes for the investigation of the relations between industrial work and disease in workmen, Germany has had until now no similar institution. Since July 1, 1925, compulsory medical notification of important industrial diseases, such as lead poisoning, glassmakers' cataract, benzene and aniline poisoning, has been in force. In order that the medical profession may become more familiar with these diseases, which, fortunately, are comparatively rare, lectures and laboratory courses in the field of industrial diseases in general have been organized.—K. R. D.

INDUSTRIAL DISEASES IN FRANCE. *Paris Letter, Jour. Am. Med. Assn., Nov. 7, 1925, vol. 85, p. 1500.*

The official bulletin of the ministry of labor contains information pertaining to industrial diseases in 1923, and their relation to the Act of Oct. 25, 1919. Thus far, under the provisions of this Act, only lead and mercury poisoning are considered. There were 1,025 cases of lead poisoning in 1923, as against 797 in 1922. The increase may signify merely that, as the law becomes better known, notifications are made more regularly. In 744 cases the diagnosis was simple lead colic. In 114 cases no exact diagnosis was made. The other cases are distributed among the complications of lead poisoning. The period of disability, which ranged from eight to fifteen days, was stated in only half of the cases. One notification read, permanent partial disability; another, probably permanent disability. Nine notices mention hospitalization of the patient, and nine cases were fatal.

The industries that gave rise to lead poisoning were enameling of metals, 278 cases; manufacture and maintenance of storage batteries, 249 cases; manufacture of red lead, 150 cases; metal foundries, 58 cases; lead foundries and plating with lead, 54 cases; painting of buildings, 41 cases; printing, 26 cases; and others.

In 1923, the number of cases of mercury poisoning was reduced to five. The diagnoses were: mercurial stomatitis, one; mercurial trembling, two; nephritis, two. In one case, disability extended over several months.—K. R. D.

DEFINITION AND DIAGNOSIS OF INDUSTRIAL DISEASES. *L. Teleky. Paper Read at Fourth International Congress on Industrial Accidents and Diseases, Amsterdam, 1925. Pamphlet Published by Nederl. Tijdschr. v. Geneesk., 1925, pp. 19–32.*

Disease may be caused by occupation, but economic or housing conditions, or the class from which the workers come, may be the determining factor. Certain diseases, such as anthrax and lead poisoning, are definitely associated with occupational risk; but industrial diseases should include all affections more prevalent among workers than among the rest of the population. Diagnosis in these affections is difficult, as no pathognomonic symptoms are present. With regard to industrial poisoning three distinct periods occur: (1) that during which absorption without signs is occurring, (2) that when signs can be detected without illness, and (3) the development of actual symptoms. Com-

pensation may be claimed for the second as well as for the third stage. Individual susceptibility may be only a cloak to hide preventive inadequacy. Expert independent medical men are required in industrial hygiene, the importance of which is bound to increase as time goes by.—A. J. C.

HEALTH AND INDUSTRIAL EFFICIENCY. *A. Greenwood. Jour. Roy. San. Inst., Nov., 1925, vol. 46, pp. 217–221.*

The author quotes authorities to prove that the state of English public health is not satisfactory. Two out of every five young persons starting as wage-earners have some disability. Hence sickness suffered by adults is excessive; it amounted in 1924 to the equivalent of twelve months' work of 447,115 persons. Rheumatic diseases alone in sickness payments cost nearly £2,000,000 a year. The health of the worker is not merely an industrial problem; it is a social question. Old factory buildings quite unsuited for their purpose are too prevalent in the land; some are not even safe. Research is pointing the way to improvements, but its findings are not sufficiently adopted. Industry cannot afford to tolerate the inefficiency which impaired health entails. There is need for reorganization of industrial medical service in the interests of national well-being and economic efficiency.—E. L. C.

INDUSTRIAL INSPECTION IN BELGIUM IN 1923. *Internat. Labour Rev., Nov., 1925, vol. 12, pp. 699–701.*

The annual report from Belgium deals separately with the seven inspection districts without giving any general summary, or presenting the seven reports on parallel lines; hence it is difficult to follow. Attention appears mainly to have been paid to hours of labor in order to insure compliance with the Eight-Hour Day Act, which, however, was generally observed in large establishments. Illegal employment at night in bakeries is reported from the Antwerp district. The Sunday Rest Act is fairly observed in most districts. Work in respect to hygiene and safety is reported as needed in the Bruges district; and in the Liége district the installations of efficient exhausts for fumes are noted; and the fact that new establishments and extensions are better planned and equipped than the old. Applications for permission to engage in dangerous, unhealthy, or noxious trades numbered 4,248 during the year; contraventions of the law in connection with these trades gave rise to the second largest group of prosecutions. No special studies of industrial health appear to have been made.—E. L. C.

INSPECTION OF MINES IN INDIA IN 1923. *Internat. Labour Rev., Nov., 1925, vol. 12, pp. 702–703.*

This is taken from the Report of the Chief Inspector of Mines in India. The number of persons employed was 234,864, about one-third of whom worked at the surface. Children under 12 years of age employed numbered 7,360 when the Mines Act in 1924 made such employment illegal under the age of 13 years. Still this Act does not prohibit the employment of women underground; in 1923 there were 80,254 women employed of whom more than one-half worked under-

ground. There is strenuous opposition by coal owners to proposals for prohibiting such labor. Hours of work are now limited to fifty-four, but a shorter week than this is often observed. The annual output per person was only 103 tons—about one-fifth the output of the United States; this difference is attributed to the absence of labor saving appliances, since most of the mines are operated without mechanical power. Frequency of fatal accidents (1.65 per thousand employed) has been rising since 1914 as the workings have been deepened and extended. With this deepening and extension, ventilation of mines has become less satisfactory; at the same time more explosives are used, and mines have become more dangerous. These matters are receiving careful attention.—E. L. C.

LABOUR CONDITIONS IN CHINA. *Internat. Labour Rev., Nov., 1925, vol. 12, pp. 668–676.*

A report published by the British Foreign Office based on information obtained from consuls as to labor conditions in China is here noted. Every possible variety of condition from good to the worst appears to exist in that vast country. But as yet most industrial undertakings are still run on the lines of peasant industries. With regard to hours, great variations exist, but the Mosaic seventh day ordinance appears never to have reached the East, and in almost every trade the working week consists of seven days. Hours vary from eight hours per day to fourteen or fifteen, not only from locality to locality, but even in the same locality. The number of public holidays is large, and these have to take the place of the regular weekly days of rest. In some areas two days' rest per month is granted. Conditions of work for the most part are unsatisfactory and wages are low; as a result we read that although women work faster than children, owing to their being frequently unable to work on account of illness they are not so much depended upon. A general rise of wages during the past few years would not seem to have kept pace with the rise in cost of living. No restriction is in force governing child labor, and excessively long hours, both on day and night shifts, are worked. Where shifts of twelve to fourteen hours are worked, children and young persons work alongside adults. In the Shanghai district 14.5 per cent. of the workers are under 12 years of age. In some country districts, work at hammering pewter for example, continues from 6 A.M. to midnight, children also being compelled to work; while they are called on to carry loads greatly in excess of normal weight. On the other hand, at Newchwang, female and child labor can hardly be said to exist, and working hours are only about eight a day. Rug workshops in Tientsin and Peking are on the borderland between the old handicraft and the modern factory system; the rooms are described as "dark, dusty and unventilated, the workrooms used as dormitories; no sanitary appliances; hours of work from twelve to fourteen a day; apprentices starting sometimes at 8 or 9 years of age;" after which follows the illuminating remark: "tuberculosis and trachoma both prevalent." Sanitary conditions in silk factories at Chefoo are ex-

tremely bad; ventilation does not exist; no clothing is worn above the waist; all workers live in the factories; they must be there by nightfall; when work is finished at night, the men pull out their rolls of bedding and sleep on the floors, or on the ground of the courtyard. They work, they eat, they sleep in the same quarters. In contrast, a factory is reported at Nanking possessing all modern welfare accommodation.—E. L. C.

SYSTEMIC OCCUPATIONAL DISEASES: OCCURRENCE, TREATMENT, AND PREVENTION

TUMORS AND TRAUMA. *F. Sauerbruch. Paper Read at Fourth International Congress on Industrial Accidents and Diseases, Amsterdam, 1925. Pamphlet Published by Nederl. Tijdschr. v. Geneesk., 1925, pp. 11–18.*

Trauma may contribute to new growth in a predisposed person. In the case of tar this substance chronically poisons the system before any local factor comes into play. Trauma plays a definite part in certain non-malignant growths, *e. g.*, keloid and xanthoma. The connection between malignant growths and trauma is less certain, but cases occur where a connection can be established; instances of sarcoma of the ulna and of the kidney are given, both commencing three months after injury at the site of the growth. A blow may be followed by a sarcoma, but prolonged trauma is more necessary to carcinoma. When a legal decision is required, a tumor must be proved to be present in the region damaged and the interval between its appearance and the injury must not be too long; for sarcomas from three weeks to two years, for carcinomas about three years.—A. J. C.

DISCUSSION ON THE NATURE, PREVENTION, AND TREATMENT OF FIBROSITIS. *Proc. Roy. Soc. Med., Nov., 1925, vol. 19, pp. 24–27.*

Dr. J. A. Glover gives data referring to the occurrence of fibrositis in a sample British population of insured persons during one year.

	Males	*Females*
Population.....	58,000	33,000
Cases of:		
Lumbago.....	584	95
Other rheumatism.	363	235
Sciatica and brachial neuritis....	172	46

All forms of fibrositis increase in frequency with age in both sexes. Sciatica is more prevalent among males, and brachial neuritis among women. "The comparative absence of lumbago in women may partly no doubt be explained by the smaller occupational stress experienced by women on the lumbar muscles, and a similar explanation may perhaps account for the heavier relative incidence of sciatica on men, but it is difficult to see why women should suffer more than men from brachial neuritis—possibly dress is to blame." The prevalence of fibrositis as estimated is compared with Leipzig figures and found favorable. Fibrositis, especially lumbago, is high in the industrial towns of South Lancashire, possibly owing to exposure to cold on leaving warm cotton mills.

"The most outstanding feature in the occupational distribution amongst

the males was the large number of metal workers suffering from fibrositis. This excess was almost equally prominent in the number of cases of muscular rheumatism, lumbago and sciatica as well as in cases of acute and subacute articular rheumatism. Miners, on the other hand, though in marked excess in the subacute rheumatism category, showed no excess in muscular rheumatism, lumbago or sciatica."

Dental hygiene in childhood and adult life is advocated as a preventive. "First aid for minor sepsis, particularly the provision of iodine and dressings in many occupations, would be of value in the prevention of fibrositis as it has been found to be in the prevention of such industrial diseases as 'beat knee.'

"The avoidance of chill can be largely accomplished by the provision of pithead and works baths and drying rooms, and by the use of special working clothes."—E. L. C.

POISONOUS HAZARDS AND THEIR EFFECTS: GASES, CHEMICALS, ETC.

THIRD PROGRESS REPORT OF THE SUB-COMMITTEE ON BENZOL, CHEMICAL SECTION, NATIONAL SAFETY COUNCIL. *Cleveland Safety Congress, Sept. 28–Oct. 2, 1925, pp. 15.*

This report consists of the history of the investigation and the practical results and findings of the survey.

The industries considered used benzol in quantities of 50 to 10,000 gallons per week. Plants producing benzol obviously handle much larger quantities but in such cases the nature of the processes employed requires completely closed systems. Chances of benzol poisoning are therefore slight if not negligible. Though the committee investigated such plants, they concluded that "chronic benzol poisoning may be expected to play but a minor role, the hazard consisting in acute cases due to carelessness in the cleaning of tanks, breaks in the piping system or similar accidents. A very small proportion of our non-fatal cases and but 5 out of a total of 22 fatal cases have occurred in industries of this type."

Plants having the nonenclosed system are divided into three groups: (1) those using a small amount of benzol, 50 to 400 gallons per week, and having no local ventilation; (2) those using large amounts, 400 to 5,000 gallons per week with local ventilation; (3) those using large amounts without local ventilation.

Concentrations of benzol in the air of plants with ventilation varied from 70 to 500 parts per million to 200 to 1,800 parts per million in plants without ventilation. In this connection the committee states: "In general, we may conclude from these studies of workroom air that rooms in which benzol is evaporated into the air without local exhaust ventilation will in most cases show high concentration of the fumes in the air of the rooms."

Several pages are devoted to a section on "Chronic Poisoning of the Workers as Evidenced by Blood Exam-

ination." In the committee's previous report (see THIS JOUR., 1925, vol. 7, Abstr. Section, p. 75) it was found that "a deviation of 25 per cent below the normal value of 7,500 white cells per cubic millimeter of blood may be taken as presumptive evidence of benzol poisoning in the absence of other obvious causes;" etc. Then on the basis of the data the committee now has it concludes that "the use of benzol (except in enclosed mechanical systems) even when the workers are protected by the most complete and effective systems of exhaust ventilation keeping the average concentration of benzol in the workroom air below 100 parts per million; involves a substantial hazard. We would urge the desirability of discovering harmless substitutes for benzol for use in any process where this is feasible. Where this cannot be done the worker exposed to benzol fumes should be safeguarded so far as possible by the installation of the best possible exhaust system and by systematic monthly medical examinations with a view to the detection of incipient benzol poisoning at the earliest possible moment."

A few pages of the report are devoted to a study of the toxicity of certain homologues of benzene including toluene, the xylenes, and "a mixture of those homologues boiling above the xylene but mostly below 200 degrees C., commercially known as Hiflash naphtha. For comparison, pure benzene was also used in the tests."

The report on the last portion of the investigation is not intended to be complete as the necessary laboratory work is still in progress at the Yale Medical School. The committee, however, states: "It can scarcely be doubted, however, in view of the injection results here reported, that xylol, toluol and Hiflash naphtha will prove to be relatively free of the specific affinity for the central nervous system and the blood-forming organs characteristic of benzol. If this tentative conclusion is confirmed by our inhalation experiments, the serious attention of manufacturers now using benzol should be given to the possibility of substituting one of these other or relatively harmless substances, wherever the conditions of a given manufacturing process make it possible to do so."—P. D.

CARBON BISULPHIDE POISONING. TWO CASE REPORTS. *R. L. Cameron. N. Y. State Dept. Labor, Indust. Hyg. Bull., Sept., 1925, vol. 2, p. 12.*

The first patient was a man 25 years of age who had worked from Jan. 5, 1923, to April 10, 1923, where carbon bisulphide is used in making artificial silk from cellulose. He complained of loss of appetite, loss of weight, vertigo, mental depression, hallucinations, and irritableness. He also stated that he was uncertain in his gait. The findings in the physical examination were as follows: His eyes reacted to accommodation and light. The tongue protruded in a median line with slight tremors. There was no anesthesia of the fingers. The lungs were clear throughout; the heart was not enlarged, there were no organic or inorganic murmurs. The abdomen revealed negative findings; the genitals were normal; there were no hemorrhoids or other rectal sores. The extremities were normal. The

Romberg sign was present as were all other nerve reactions, which were exaggerated. Following this examination the patient was sent to the hospital for observation. The urine was negative except for a very slight trace of albumin. The blood changes were not marked; if anything, there was an increase in the hemoglobin content. After ten days at the hospital the symptoms began to clear up and the patient had an uneventful recovery.

The second patient, a man 40 years of age, who had worked ten months in the carbon bisulphide room, complained of weakness in his legs and arms, loss of weight, general depression, and irritableness. He was taken off his job and sent home where he was kept under observation. Treatment was symptomatic. As soon as his mental state improved he was sent to the hydrotherapy department for massage and stimulation of his affected parts. Blood and urine examinations showed negative findings except for an increase in hemoglobin. The man improved under hydrotherapy treatments and is now working in another department.—M. C. S.

MY EXPERIENCE WITH CERTAIN INDUSTRIAL POISONS. *W. F. Boos. Boston Med. and Surg. Jour., Oct. 22, 1925, vol. 193, pp. 757–761.*

The author emphasizes the importance of co-operation between the chemist and the doctor. The symptoms and the treatment (medical and chemical) of certain industrial poisonings are discussed under the following heads: nitrous fumes, benzol, turpentine (often mistaken for lead poisoning), wood alcohol, acid and alkali burns, chrome burns, cyanide rash, phenol, heavy metals (lead), and copper (unknown as an industrial poison) and zinc. The article concludes with paragraphs on trade anaphylaxis and furunculosis from oil or grease.—B. L. G.

IS CADMIUM AN INDUSTRIAL POISON? *L. Schwarz and A. Otto. Abstr. as follows from Ztschr. f. Hyg. u. Infektionskrankh., 1925, vol. 104, p. 364, in Office internat. d'hyg. pub., Bull. mensuel, Sept., 1925, vol. 17, p. 1036.*

Cadmium is contained in zinc blendes and calamine in an amount which may be as high as 6 per cent. The authors made experiments with small doses of cadmium salts on guinea-pigs and cats by subcutaneous injection and by feeding. The dose given to guinea-pigs subcutaneously was 0.6 to 1 mg. per kilogram weight every other day from one to two months; it caused more or less marked illness with rapid diminution of hemoglobin, a diminution of red cells, and an increase of lymphocytes. Cats received from 1 to 10 mg. per kilogram by mouth every day; after some weeks they fell ill and some died. From the commencement they showed inflammation of the conjunctivae and respiratory passages. Sometimes there was vomiting, and toward the end, diarrhea; inflammation of the intestinal tract was found postmortem. Although cases of poisoning in industry are rare, cadmium ought to be classed among industrial poisonous metals.—E. L. C.

SAFE HANDLING AND STORAGE OF CHLORATES AND PERCHLORATES. *Chemical Safe Practices Sheet No. 8, Nat. Safety News, Sept., 1925, vol. 12, p. 47.*

AGREEMENT: PAINTERS, DECORATORS, AND PAPER HANGERS—NEW YORK CITY. *U. S. Month. Labor Rev., Sept., 1925, vol. 21, pp. 555–556.*

An agreement made by the Painters' District Council No. 9 with the Association of Master Painters and Decorators and the Cabinet Makers Employers' Association of New York City provides for a forty-hour working week consisting of five eight-hour days, restricts the use of overtime, and lays down the following health rules:

Windows must be kept open while ceilings or walls are being painted. When fresh air is not available a five-minute rest period in each hour shall be allowed.

Paint containing benzol shall not be used nor shall benzol be added to the paint on the job. When penetrating stains or removers containing benzol are used, as many men as practicable shall be employed to minimize the length of exposure.

Shellac cut in wood alcohol shall not be used nor shall wood alcohol be used on the job.

Paint materials suspected of being injurious to health are to be investigated by the Joint Trade Board.

The Joint Trade Board advocates legislation requiring the labeling of paint materials in original containers to show ingredients.

Surfaces painted with lead paint shall not be sandpapered or scraped by a dry process.

Smoking shall be avoided during working hours.

Where running hot or cold water is not available, a sufficient supply of pails of water and soap powder shall be furnished to the men twice a day. No common pail or bucket shall be used for washing by more than five men.

Fresh drinking water and sanitary cups shall be provided twice a day during working hours.

Men shall not eat their lunch in paint or clothes locker on new operations.

Drop cloths shall be maintained in a sanitary condition by the employer.

Overalls shall be kept clean by the journeymen.

Men, no matter how slightly injured, shall be taken care of by a physician.

—M. C. S.

SOME ASPECTS OF LEAD ABSORPTION. *S. A. Smith. Med. Jour. Australia, Sept. 26, 1925, vol. 2, pp. 391–394.*

The author deals with lead poisoning as seen at Broken Hill by the Technical Commission of Inquiry of 1920. He accepts the position that lead poisoning originates in the main from the inhalation of dust containing lead. The toxic dose has been variously estimated: by Duckering at 2 mg.; by Teleky at a little more than 1 mg.; and at Broken Hill at between 1 and 2 mg., per day. These three estimations are not really far apart. The tendency to be affected with lead poisoning was found to increase with years of employment underground as follows:

YRS. EMPLOYED	NO. EMPLOYED	% AFFECTED
Up to 11	660	0.15
11 to 20	412	2.6
21 to 30	271	3.7
31 and over	67	4.5

Blue line on the gums was not frequent among the miners. The urine, however, usually contained lead, but this, although an indication of absorption, was no sign of poisoning. The same is to be said for basophilia which, since it is not specific and is relatively inconstant, is not so valuable an indication of absorption as is lead in urine. The author discusses carefully the question whether arteriosclerosis and nephritis result from absorbing lead over a long period of years, quite apart from any attack of lead

poisoning. The incidence of these troubles among the miners, and also among sandstone miners and among surface workers at Broken Hill is compared. So little difference is found that the author concludes that the absorption of small doses of lead for a long period of years does not necessarily produce any disease or tissue damage to the arteries or the kidneys.—E. L. C.

LEAD POISONING RESULTING FROM THE MANUFACTURE OF STORAGE BATTERIES. *Balsac, Lafont, and Feil. Abstr. as follows from Bull. méd., in Paris Letter, Jour. Am. Med. Assn., Oct. 31, 1925, vol. 85, pp. 1412–1413.*

In this article are published the results of an inquiry made to complete the authors' previous investigation of occupational morbidity among workmen employed in the manufacture of accumulators. They found that lead poisoning in workmen so engaged is frequent. They examined fifty workers, two women and forty-eight men. Of the latter, nineteen were Frenchmen and twenty-nine were Moroccans. Only two of the workers were under 20 years of age, while eight were past 40. The stigmas of lead poisoning and of preliminary stages, which the authors studied particularly, are: urticaria, basophilic stippling of red blood cells, nucleated red blood cells, Teleky's sign (extensors of the wrist too weak to raise the hand above an angle of 45° when the forearm is extended), and finally lead colic. For the nineteen Frenchmen and two French women the findings were: urticaria or wheals, 8 (38 per cent.); red blood cells with granulations, 15 (71 per cent.); nucleated red blood cells, 0; sign of the extensors, 7 (33 per cent.); lead colic, 9 (43 per cent.). For the twenty-nine Moroccans the findings were: wheals, 21 (72 per cent.); red blood cells with granulations, 23 (80 per cent.); nucleated red blood cells, 22 (79 per cent.); sign of the extensors, 14 (49 per cent.); lead colic, 3 (11 per cent.).

It will be seen that workmen employed in the manufacture of accumulators present a very high percentage of stigmas and symptoms of lead poisoning—much higher, namely, than is found in other lead industries. That the stigmas and symptoms (aside from the lead colic) were more frequent in the Moroccans than in the Frenchmen is presumably because the latter were better able to understand and adopt proper prophylactic measures. The stigmas of lead poisoning are found most frequently among the spreaders and mixers, and this class of workmen should therefore receive special medical supervision. This is compulsory in accumulator factories, as well as in other establishments using large quantities of lead.—K. R. D.

DUST HAZARDS AND THEIR EFFECTS

CASE OF SILICOSIS WITH NECROPSY. *A. R. Riddell. Canadian Med. Assn. Jour., Aug., 1925, vol. 15, p. 839.*

PNEUMONOCONIOSIS: A SUMMARY OF PRESENT KNOWLEDGE. *E. L. Collis. Paper Read at Fourth Interna-*

tional Congress on Industrial Accidents and Diseases, Amsterdam, 1925.

Starting from the inquiries of the British Royal Commission on Metalliferous Mines and Quarries, Professor Collis gives an exhaustive and yet condensed summary of an important subject. Pneumonokoniosis is defined as disease of the lungs due to inhalation of dust. In this respect organic dusts are held to be nearly innocuous, and inorganic dusts to vary greatly in their harmfulness. Asthma, which incapacitates but does not kill, is a form of pneumonokoniosis when it results from dust of certain vegetable husks. Bronchitis is displayed as the most important disease of the group on account of the morbidity and mortality it causes; moreover it is always present when any other member of the group is present. Pneumonia occurs, as well as bronchitis, when dust is fine enough to reach the alveoli and the bronchioles. But if fine dust is composed of silica, there also results a form of pulmonary fibrosis known as silicosis, which predisposes to tuberculous infection. This results from chemical action which first causes death and mummification of dust cells and subsequent fibrotic changes.

The article concludes with a condensed summary of statistical, clinical, bacteriologic, chemical, and pathologic research recently carried out on silicosis in different countries. A list of references to the original papers consulted is given.—D. A. C.

OCCUPATIONAL INFECTIOUS DISEASES: OCCURRENCE, TREATMENT, AND PREVENTION

Tuberculosis and Trauma. *F. Zollinger. Paper Read at Fourth International Congress on Industrial Accidents and Diseases, Amsterdam, 1925. Pamphlet Published by Nederl. Tijdschr. v. Geneesk., 1925, pp. 110–125.*

Years ago the connection between surgical tuberculosis and injury was accepted, but today, apart from direct inoculation with tuberculous infection, the influence of trauma in causing tuberculosis is by no means considered certain. Compensation calls for definite evidence, and is not prepared to accept loose hypothesis. Hence statements are more critically examined; a so-called injury is often found to be merely a trifling knock, the importance of which has been exaggerated by after events; X-ray examination has enabled other tuberculous foci to be discovered; improved diagnosis discovers tuberculosis earlier, before any question of injury arises.

In order to establish a connection between injury and tuberculosis, the injury must have set up conditions favorable to a tuberculous focus, and the infection must have been present in the blood of the patient. Professor Zollinger considers that these two conditions are seldom present unless when an injury definitely breaks down an old tuberculous focus. He even points out that Honsell has claimed injury as producing a local increase rather than a decrease of resistance. Injury might lead to the subsequent develop-

ment of tuberculosis if the infection is introduced through the injury, or if the resisting power of the patient is so lowered by the injury that he succumbs to tuberculous infection, possibly inhaled in the ordinary way. Trauma may exert an influence either by a local action, which must be considered unusual, or by disseminating the infection from a quiescent focus, *e.g.*, tuberculous peritonitis caused by the bursting of a mesenteric gland; or by aggravating a quiescent focus, *e.g.*, in a joint. The period between the injury and the development of symptoms may vary from two weeks to five months; but in the case of meningitis, the period is never longer than fourteen days. Generally speaking an industrial accident is seldom, if ever, entirely responsible for the occurrence of tuberculosis. But in most countries the law allows at least some likelihood of the possibility of its occurring in this way.—A. J. C.

SYPHILIS IN LABOR ACCIDENTS. *S. Diez. Abstr. as follows from Policlinico, Rome, 1925, vol. 32, p. 775, in Venereal Disease Information, U. S. Pub. Health Ser., Sept. 20, 1925, vol. 6, p. 283.*

In judging of accidents in relation to syphilis several points must be taken into consideration. There must be a spirochete infection occurring during work and entering through a traumatic lesion, or a traumatic lesion sustained during work by a syphilitic subject which takes an atypical course and gives rise to complications which would not be experienced by a normal subject; or in consequence of a labor accident tertiary manifestations develop at the site of injury in a syphilitic subject. If spirochete inoculation takes place while the workman is engaged in his occupation directly or indirectly, liability arises under these circumstances. If tools are used which carry infectious matter or when direct contact with syphilitic fellow laborers brings on the disease, this is considered subject to workmen's compensation. Infections of laboratory hands and nurses come under this head. Physicians and assistants who are infected while examining a female patient suffering from venereal disease, if they use the necessary precautions, are entitled to doles.

When a laborer sustains a wound while at work and it is later infected with syphilis, the argument may be raised that the syphilitic germ is found in syphilitic foci only or in matter derived from it by contact, while other pus infections might be found on tools, clothing, the skin, or material used in treatment. Only when the insured person comes in contact with the infectious matter while engaged in his occupation can a labor accident be established.

In 1923, a case was brought before the Italian Tribunale di Grosseto. Insurance was denied a patient who had sustained a wound on the genitals during an industrial accident. He had then sustained syphilis by intercourse. The author argued that the intercourse was not strictly a wanton exposure and that in this case the syphilitic infection might be considered secondary to the injury sustained while at work.

Two of the main requirements are the appropriate time of incubation dating from the accident and the proof that infection was sustained while at work.

OCCURRENCE AND PREVENTION OF INDUSTRIAL ACCIDENTS

ACCIDENTS AND DISEASES. *B. Cuneo. Paper Read at Fourth International Congress on Industrial Accidents and Diseases, Amsterdam, 1925. Pamphlet Published by Nederl. Tijdschr. v. Geneesk., 1925, pp. 69–78.*

The author approaches his subject from two different aspects: the effect of accidents in causing illness, and then the influence of preexisting illness on an accident. He states that even for an expert the French law is difficult to explain. Just as in the case of ex-soldiers, workers tend to magnify the influence of accidents on sickness which develops later. The previous history of the claimant must be carefully investigated and any direct connection between the accident and the illness must be ascertained. A true conclusion can only be arrived at by close investigation of each phase of illness which might be accentuated, if not actually caused, by the accident. In every case the worker is entitled to the benefit of any doubt, and full compensation should be granted if there is the probability that the sickness originated in the accident. When an accident occurs during chronic illness, the amount of temporary extra incapacity alone calls for consideration; but where manifest deterioration occurs, partial compensation is generally granted.

Where pronounced ill health was present before the accident, and may even proceed to a fatal termination, the physician must state definitely the position and what would have been the probable course of the disease if no accident had taken place. He must then refer the matter to the Court to determine whether the accident in any way accelerated the probable course of events.—A. J. C.

SAFETY'S PLACE IN THE TEXTILE INDUSTRY. *G. H. Van Emburgh, Jr. Nat. Safety News, Nov., 1925, vol. 12, pp. 17–18.*

The following tables show what the Clark Thread Company has accomplished through organized safety work:

INJURIES CLASSIFIED ACCORDING TO COMPENSATION

YEAR	COMPENSATION		
	None	Temporary	Permanent
1921	53	100	4
1922	45	65	10
1923	11	12	6
1924	3	7	6
1925[1]	0	2	0

COMPENSATION PAID INJURED EMPLOYEES

YEAR	AMOUNT
1921	$8,012.40
1922	7,119.77
1923	5,426.18
1924	2,278.92
1925[1]	264.99

NUMBER OF WORKING HOURS LOST BECAUSE OF ACCIDENTS

YEAR	NUMBER
1921	7,442.0
1922	8,395.0
1923	3,491.0
1924	3,958.5
1925[1]	734.5

[1] First eight months.

—M. C. S.

AN ANALYSIS OF THREE HUNDRED ACCIDENTS IN WOODWORKING FACTORIES WITH SUGGESTIONS AS TO SAFE PRACTICE AND SUITABLE MACHINE GUARDS. *H. L. Reid. N. Y. State Dept. Labor, Special Bull. No. 139, 1925, pp. 63.*

This bulletin contains the results of an investigation of accidents in 300 woodworking factories employing 15,805 workers. The machine responsible for the greatest number of accidents is the circular saw. Thirty-five illustrations are included which show suitable guards for the various machines used.—M. C. S.

PRESSURE VESSELS—FIRED AND UNFIRED. PART II—STEAM JACKETED VESSELS, DIGESTERS, STILLS, BLOW CASES AND AUTOCLAVES. *Safe Practices Pamphlet No. 68, Nat. Safety News, Sept., 1925, vol. 12, pp. 37–46.*

GETTING SAFETY ACROSS TO THE COMMERCIAL DRIVER. *Safe Practices Pamphlet No. 69, Ibid., Oct., 1925, pp. 53–62, 64.*

INDUSTRIAL SURGERY

INJURIES OF THE HAND AND FINGERS. *A. Whittek. Paper Read at Fourth International Congress on Industrial Accidents and Diseases, Amsterdam, 1925. Pamphlet Published by Nederl. Tijdschr. v. Geneesk., 1925, pp. 94–101.*

A method of treating burns not generally known is described. It consists in covering burned surfaces after any blisters have been evacuated with thin silver foil bandaged in position. The author claims that pain is quickly relieved thereby, and that burns, even though of the second degree, heal rapidly without leaving a scar. He next describes injuries resulting from circular saws which frequently cause ragged wounds. Here the wound edges require to be excised before being sutured. Joints must be covered up by skin flaps, specially constructed if necessary, since a joint left open is particularly liable to become infected. The semiflexed position should be adopted when bandaging fingers after injury, since a digit ankylosed in the extended position is worse than useless. Injuries to the hand should be given inpatient treatment more often than is usually done, since serious complications may arise from sepsis during outpatient treatment and preservation of the function of the hand is all-important to a worker. Immersion of the hand in warm baths is of great assistance and permits passive movements to be commenced at an earlier date. The author deals with other surgical points with regard to injuries to the hand, but they do not differ from the usual technic set out in surgical textbooks.—A. J. C.

HEAT, COLD, AND HUMIDITY

THE WORK OF THE TIN-PLATE DOUBLER. *H. M. Vernon. Jour. Nat. Inst. Indust. Psychol., Oct., 1925, vol. 2, pp. 373–376.*

The work of tin plate millmen consists in rolling out red-hot plates of steel into thin sheets of metal, and it is of a very arduous character. The work of the "doubler," who has to double over the red-hot sheets and press a foot on the bend, is specially so. These sheets weigh about 30 pounds, and are doubled three times. The three stages of doubling (of thirty-six sheets) take altogether about thirty-five minutes, and then the doubler rests for thirty minutes. Kata-thermometer observations showed that, owing to the radiant heat from the red-hot sheets, the cooling power of the air near the doubler had a negative value of 0.8 to 3.7 (*i.e.*, the kata was *warmed* up to a temperature above 100°F.). However, the wet kata-thermometer gave positive values of 18 to 23, and these values, under ordinary circumstances, are considered to indicate an ample cooling power. Hence the cooling powers observed in the presence of radiant heat are not comparable with those observed in its absence. They were fully confirmed by laboratory observations, and they may be taken to indicate that a man covered with perspiration (as the doubler usually is) does not feel radiant heat nearly so much as a man with a dry skin.

The pulse rate of the doubler was found to average 90 per minute before starting work, 150 at the end of the first (and heaviest) stage of the doubling, and 125 and 119, respectively, after the succeeding stages. A pulse rate of 150 is usually observed only after very strenuous exercise, such as boxing. Hence it is a matter of satisfaction that a machine has been invented, the Melingriffith machine, which will entirely replace the arduous work of the doubler.

ABSTRACT OF THE LITERATURE OF INDUSTRIAL HYGIENE

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SYSTEMIC OCCUPATIONAL DISEASES: OCCURRENCE, TREATMENT, AND PREVENTION

TREATMENT OF RHEUMATISM IN INDUSTRY. *Brit. Med. Jour., Dec. 5, 1925, vol. 2, pp. 1083–1085.*

This is a general discussion of the treatment of rheumatism in industry held at the London Conference of the International Society of Medical Hydrology.

The chairman, Dr. G. Monod, said that in France chronic rheumatism is not prevalent in the working classes; hence special accommodation is not provided, nor are statistics as to its prevalence published. He attributed the relative immunity to the fact that France is blessed with sunshine. A contrast was presented by Sir G. Newman who said that in Great Britain the rheumatic group of diseases cost not less than £2,000,000 a year, and cause an annual loss of time amounting to 3,000,000 weeks. The burden to the state is as serious as that of scourges like cancer and tuberculosis. Teamwork is necessary to attack the problem from every side, both to increase powers of resistance and to remove infective organisms. Teamwork is as necessary in treatment as in prevention; spa hospitals are invaluable to combat the disease.

Dr. J. van Breemen, Amsterdam, said that cases of rheumatism in Holland are numerous. Every year about 1,000 are treated at his Institute, and another 1,000 are sent to spas. Me-

thodical research into causation is needed. He expressed the opinion that every occupation has its distinctive rheumatism. The position in Denmark was presented by Dr. H. Jansen who estimated that 12 per cent. of males suffer from chronic rheumatism, and 14 per cent. of those permanently invalided from whatever cause, as contrasted with 13.5 per cent. of those invalided by pulmonary affections. Interest in the matter in Denmark is being aroused. Dr. G. Kahlmeter, Stockholm, said that articular rheumatism holds a dominating position in Sweden, where there are many small spas, but these are neither big enough nor good enough for the purpose of treatment. A committee has been established in Sweden, and the question of providing a central hospital in Stockholm is under consideration.

The influence of damp and cold in causing rheumatism was pointed out by Dr. F. Fox, London, who considered that spa treatment is important, but that rheumatic clinics in towns are needed. Dr. L. J. Llewellyn held that the rheumatic subject must adapt himself to the climate of his country, for which purpose hydrotherapeutic procedure is important. Rheumatism as a national scourge should be dealt with by national policy. He favored establishment of centers on the same line as that which has been adopted in the United States, particularly in New York. An estimate was presented by Dr. M. B. Ray that in the London district alone 22,000 persons would benefit from more enlightened treatment, while many others have passed beyond that stage. Inpatient treatment is not always needed; most cases can be treated at a suitable clinic where douches, baths, manipulations, and ionization can be given, and then can be drafted to the spas.

The amount of spa treatment available in Great Britain was presented by Dr. K. Pringle, Harrogate. There are about 680 beds in all, treating about 1,000 patients annually. Each of the seven hospitals has long waiting lists. At the spas good results follow usually within a few weeks, but months may be necessary for chronic joint cases. Osteo-arthritis can only be diagnosed certainly by X-ray. Apparently the prevalence of the disease in males and females is not far different. Dr. C. W. Buckley, Buxton, pointed to unsatisfactory conditions resulting from too short periods of treatment, especially for industrial cases admitted to spas by ticket. He also advocated the establishment of clinics to act as clearing houses for the spa hospitals. He considered that a scheme on the lines of the tuberculosis campaign is necessary. A brief account of the various Roumanian spas was given by Professor Theohary. In that country civil servants are treated at the three state owned spas at reduced fees. The uninsured poor are treated in Red Cross sanatoriums and at one of the state spas.—E. L. C.

POISONOUS HAZARDS AND THEIR EFFECTS: GASES, CHEMICALS, ETC.

POISONOUS GASES FROM EXPLOSIVES. *C. D. Pratt. Abstr. as follows from Min. Congress Jour., 1925, vol. 11, pp. 395–397, in Chem. Abstr., Oct. 10, 1925, vol. 19, p. 3020.*

This is an excellent review of the

conditions under which poisonous gases are produced and methods for their control or avoidance. Explosives for use underground, or in close places, should be well balanced. As the paper wrapper is an integral part of the system to be included in calculating the oxygen balance, its removal and especially its separate insertion in the borehole, as is not uncommon, alter conditions so that carbon monoxide may be produced. The following rules are laid down: (1) Be sure that the detonators are strong enough to explode the powder properly; (2) that they are absolutely dry. (3) Avoid using gelatins that have become insensitive through age or improper storage. (4) Reduce the contact between the fuse and explosive to the minimum. (5) Have boreholes so charged that there is no break in the continuity of the train. (6) Have explosive properly confined. (7) Avoid frozen explosives.—P. D.

Poisoning from Nitrous Gases. *J. Müller. München. med. Wchnschr., Oct. 23, 1925, vol. 72, pp. 1859–1860.*

Müller presented before the Medical Society of Nuremberg a patient who had recovered from a severe poisoning by nitrous fumes. He was sent to clean up a courtyard where a flask of fuming nitric acid had broken. He first poured water on the acid to dilute it. While doing this he felt nothing more than an inclination to cough and a slight sensation of suffocation, and he worked for the rest of the day. During the night, ten hours later, he suddenly developed acute air hunger, cough, and convulsions from suffocation. When taken to the hospital in the morning he was deeply cyanosed, with shallow respirations, 60 a minute, pulse hardly perceptible, 130 to 140, and extreme prostration. Fine râles were audible over the entire chest. There was occasionally loss of consciousness, through carbon dioxide poisoning.

During the following days jaundice appeared with moderate urobilinuria and marked urobilinogenuria, an increase of bilirubin in the blood, and at the same time the lemon yellow, scanty, sticky sputum characteristic of nitrous gas poisoning. The poisoning had therefore produced jaundice either through hemolysis or methemoglobin formation, an effect of nitrous fumes which has not up to now been observed.

The threatening symptoms yielded to subcutaneous injection of adrenaline which eased the respiration and caused the cyanosis to disappear, after treatment with stimulants, sodium bicarbonate, and calcium chloride had failed. Recovery was not complete till after two months.—A. H.

Iodico-Sulfuric Reagent for Protection against Carbon Monoxide and Other Toxic Gases. *Guillemard and A. Lührmann. Abstr. as follows from Chim. et indust., 1925, vol. 14, pp. 29–32, in Chem. Abstr., Oct. 10, 1925, vol. 19, p. 2990.*

When kept in hermetically sealed metal containers the reagent showed no loss in strength during six months at 0 to 60°, nor when kept one year in glass stoppered, paraffined bottles exposed to light. When kept in improperly closed containers, it slowly deteriorated on account of absorption of water. When in use in the mask,

atmospheric water does not interfere, presumably because of the heat evolved by the reaction, which prevents hydration taking place to any great extent. Reagent which has been used but a short time and is not spent can safely be used again if it has been kept in a hermetically sealed container. The reagent will also absorb numerous other toxic gases, *e.g.*, ammonia, hydrogen sulphide, sulphur dioxide, and the hypnotic hydrocarbon vapors produced during coal distillation.—P. D.

PHARMACOLOGICAL ACTION OF SOME POISONOUS GASES WITH SPECIAL REFERENCE TO CARBON MONOXIDE. *O. G. Chance and D. E. Jackson. Abstr. as follows from Jour. Pharmacol. and Exper. Therap., Proc., 1925, vol. 25, pp. 145–147, in Chem. Abstr., Oct. 20, 1925, vol. 19, p. 3127.*

Small quantities of natural gas (Pittsburgh fields) are almost inactive in so far as the respiration and circulation of anesthetized dogs are concerned; toxic symptoms, when they appear, are due mostly to the exclusion of oxygen. Automobile exhaust gases are more poisonous than natural gas but still have a surprisingly low toxicity. The decrease in the amount of oxygen present in the respiratory gases, as the proportion of the automobile exhaust gases is increased, is one of the chief factors in rapid poisoning by these gases. A mixture of artificial and natural gases (Cincinnati gas supply) also possesses a lower toxicity for dogs than one would expect. The artificial gas, however, is a very dangerous substance and striking pharmacologic effects are rapidly produced by it. Pure carbon monoxide is very similar to the artificial gas in its effects; the especially marked depression of the heart and its tendency to undergo ventricular fibrillation should be especially emphasized.—P. D.

THE BLOOD IN CYANIDE POISONING. *M. Hasselmann. Abstr. as follows from Klin. Wchnschr., Nov. 5, 1925, vol. 4, p. 2154, in Jour. Am. Med. Assn., Dec. 19, 1925, vol. 85, p. 2000.*

Hasselmann found a moderate polycythemia in people employed in the manufacture or handling of hydrocyanic acid. The number of leukocytes with basophilic granulation was increased in some of them.—K. R. D.

EXAMINATIONS TO DETERMINE THE VOLATILIZATION OF LEAD IN LEAD BURNING AND SOLDERING WITH FLAMES OF DIFFERENT COMPOSITION. *H. Engel and V. Froboese. Arch. f. Hyg., 1925, vol. 96, pp. 69–101.*

Engel has already shown that there is danger of lead poisoning in soldering and in lead burning and that this danger consists in the production of vapors containing lead oxide in finest division. This conclusion was based on the physical examination of men in such employment, the cases of plumbism found being in higher proportion among lead burners than among solderers. It is clear that protection against plumbism in these occupations, especially in lead burning, can be successful only if the lead vapors are removed, for cleanliness of the person and of the workplace is not sufficient.

The authors undertook to investigate the action of the various flames used in these two occupations with regard to their production of lead

oxide fumes. They assumed that under similar conditions the volatilization of lead would follow the temperature curve, although it might also be influenced by the method of applying the heat, and that practical measures for the protection of solderers and lead burners might be based on a study of the different flames used. They found that if the lead surface is played upon by a flame which produces a temperature under 1600°C. there is much less volatilization of lead, even though the flame is larger and a much larger surface is melted, than will be the case if a small very hot flame is used to melt a smaller surface of lead.

In testing the different flames so as to compare the volatilization of lead, they reproduced as closely as possible industrial conditions. They found that other factors than the heat of the flame were of great significance. Most noteworthy was the fact that the oxyhydrogen flame caused much more volatilization than the acetylene-oxygen flame, although the relative heat of the two flames is just the reverse. The minimal amount of lead volatilization was with the acetylene flame which produced only a fraction of the amount produced by the oxyhydrogen. Evidently chemical properties are responsible for this difference, for they found that if a little acetylene is added to the oxyhydrogen flame the volatilization of lead falls, and the same effect is brought about by the addition of a hydrocarbon, such as benzene, while the addition of carbon dioxide has no such effect. For industrial hygiene it is very important to establish the fact that the acetylene-oxygen flame carries far less danger than the oxyhydrogen flame, and that the addition of a hydrocarbon to the latter also reduces the danger. Illuminating gas, containing as it does hydrocarbons, causes, when mixed with oxygen, little volatilization.

They found that the volatilization of lead by a given flame is in proportion to the oxidizing property much more than to the heat. If oxygen is added to acetylene gas, the quantity of lead in the fumes rises more than is accounted for by the increase in temperature. It may be also that the roaring of the oxyhydrogen flame increases the detachment of the oxide more than happens with the quietly burning acetylene and illuminating gas mixtures. The oxide which is formed is not only very finely divided but is colloid in nature and slow to sink, remaining suspended in the air for a long period.

The methods used in these experiments are fully described and the theoretical aspects thoroughly discussed. The practical conclusions are enunciated as follows: It is possible to diminish decidedly the danger of lead poisoning for solderers and lead burners by a proper choice of the flame although all flames cause some volatilization of lead, and removal of these fumes is indispensable. The largest amount of volatilization occurs when a blowpipe oxyhydrogen flame with an excess of oxygen is used, and this is the one chiefly employed in lead burning. The smallest amount is produced by a quietly burning, slightly luminous flame containing hydrocarbons, such as acetylene-oxygen, illuminating gas-oxygen or oxyhydrogen with the addition of a hydrocarbon.—A. H.

LEAD POISONING AND A BAKERY. *P. Bodros. Abstr. as follows from Presse méd., Nov. 18, 1925, vol. 33, pp. 1532–1533, in Paris Letter, Jour. Am. Med. Assn., Dec. 19, 1925, vol. 85, p. 1981.*

M. Bodros, public health commissioner in Brest, tells that last April the bureau of public health of Brest was faced with an epidemic of lead poisoning, the cause or source of which was unknown. The thirty-two patients, with three exceptions, all lived in the same section of the city (port de commerce), and inquiry brought out that all bought their bread of the same baker, and three persons employed in the bakery had been ill. The evidence pointed, therefore, to the bakery as the source of the intoxication. Examination of the sewer connections and of the water from the boiler or caldron gave a negative result. It was discovered, however, that the baker was using to heat his oven (a direct heating system) wood that had been obtained by breaking up old boats. Examination of the wood revealed that it was covered with paint that was rich in lead salts. The origin and the cause of the epidemic were thus demonstrated. In further substantiation, it was learned that the three patients who did not reside in the affected district were in the habit of eating bread that came from the incriminated bakery. In view of these facts, the mayor of Brest issued a decree, which was countersigned by the prefect of the department of Finistère, prohibiting within the limits of the commune of Brest the use of wood of demolished ships for baking.

Legislation against the use, for baking, of wood derived from old boats is, however, not entirely new, for there were two ordinances dealing with the subject, issued in the department of the Seine, dated 1877 and 1898, respectively. The council of public health of the Seine has on several occasions, notably in 1914, rejected demands coming from dealers that the ordinance of 1898 be repealed. The council persists in refusing to permit the use, for baking, of "demolition wood," of whatever kind or origin. The oven used by the baker in question was heated by the direct heating system, but ovens with indirect heating systems are also dangerous when painted wood is used, by reason of the volatility of the lead salts and the readiness with which they become reduced to metallic dust under the action of charcoal. These vapors condense rapidly on the cold surface of the dough just as it is put into the oven. —K. R. D.

INDIRECT HEALTH HAZARDS. *R. S. McBirney. N. Y. State Dept. Labor, Indust. Hyg. Bull., Nov., 1925, vol. 2, p. 17.*

A case is reported of an electrical contractor who was installing two exhaust fans in the wall about 15 feet above the melting pots in a plant where metal alloys were manufactured. The evening following his first exposure he had chills and fever. He worked only a short time the next day but all day the third day. No gas mask was provided until the last day, but it was so filthy that he would not use it. He complained of severe vertex headache. His temperature was 98.2; his pulse, 68. His tongue was coated. His urine was negative for albumin, cop-

per, and zinc. The foreman to whom the man had complained of the fumes took the attitude that a man must become accustomed to chills if he has to work in "zinc."

Treatment consisted of acetanilide for the headache, cathartics, and forced fluids, and potassium iodide by mouth. The patient recovered entirely in twenty-four hours.—M. C. S.

LEUKEMIA FROM RADIOACTIVE INJURY. *P. Emile-Weil. Abstr. as follows from Presse méd., Sept. 30, 1925, vol. 33, p. 1297, in Jour. Am. Med. Assn., Nov. 14, 1925, vol. 85, p. 1592.*

Emile-Weil reports a fatal case of myelogenous leukemia in a mechanic occupied for several years in the preparation of radioactive substances of the thorium family. Another mechanic, working on the same substances for several years, in the same factory, died from pernicious anemia. Both were robust and of healthy families. On microscopic examination, the lesions of the spleen, liver, and bone marrow appeared to be identical with those in ordinary leukemia. It is assumed that irradiations as well as infections may induce changes in the cells in the hematopoietic organs. The author comments on the fact that the same radioactive substance seemed to be responsible for the two quite different blood diseases, probably on account of differing predisposition. He cites another case of fatal leukemia in a woman given a single intensive seven-hour application of radiotherapy seven years before.—K. R. D.

DUST HAZARDS AND THEIR EFFECTS

SOME DUSTY OCCUPATIONS AND THEIR EFFECTS UPON THE LUNGS. *T. Oliver. Jour. Roy. San. Inst., Nov., 1925, vol. 46, pp. 224–229.*

The opinion is expressed that certain dusts may have double action, one owing to physical irritation, the other to chemical action; but of all dusts, silica is the most harmful. Coal dust turns the lungs black, and fibrosis may occur from gritty particles in inhaled dust, but coal miners suffer but little from pulmonary tuberculosis. Lead miners on the other hand suffer greatly; they are exposed to dust generated when breaking rocks, or when explosives are used. Men return to work too soon after blasting. Years ago their sleeping accommodation near the mine head was overcrowded and poorly ventilated. One set of men vacated the beds for their comrades to occupy them. No wonder tuberculous infection spread. Gold miners also suffer from dust inhalation, but much has been done in South Africa to minimize risk. Evidence that asbestos can cause trouble is not definite. Iron dust certainly lingers long in the lungs, but evidence is not conclusive as to what, if any, damage it causes. Arsenic miners in the Schneeberg district of Saxony are reported to suffer from tuberculosis, and also from pulmonary cancer. The cancer has been attributed to the arsenic, but Professor Ludwig has suggested that it may be a consequence of radium emanations said to be powerful in the locality.—E. L. C.

OCCUPATIONAL AFFECTIONS OF THE SKIN AND SPECIAL SENSES

VISUAL EFFICIENCY OF VARIOUS DEGREES OF SUBNORMAL VISUAL ACUITY: ITS EFFECT ON EARNING ABILITY. *A. C. Snell. Jour. Am. Med. Assn., Oct. 31, 1925, vol. 85, pp. 1367–1373.*

Snell presents a tabulated record of 100 selected cases of defective vision, with a range *in the better eye* from 20/40 Sn. to 5/200 Sn., showing particularly the effect of these various degrees of lowered visual acuity on the individual's ability to work and on his earning capacity.

The author's summary of his findings is as follows:

1. No loss to earning ability even for the highly skilled work was found until visual acuity was reduced to 20/60 Sn. The threshold for the beginning of visual disability as reflected in earning ability lies between 20/60 and 20/100 Sn.

2. The accumulated effect of repeated trivial injuries must not be ignored from an economic point of view for those cases in which a single injury does not reduce acuity to 20/40 or less, as repeated injuries of the same degree may finally cause loss to earning capacity.

3. A 20/200 Sn. caused a total incapacity to 13.3 per cent. and a partial incapacity to an additional 13.3 per cent., so that 26.6 per cent. in this class with vision of not better than 20/200 Sn. were either completely or partially incapacitated for earning. Eighty per cent. had earning capacity with acuity between 20/200 and 20/400 Sn.

4. A 10/200 Sn. was the point of visual acuity reduction which became the point of total incapacity in all except two cases, and this may be regarded as the lowest limit of visual earning capacity.

5. The threshold of total incapacity lies between 20/200 and 2/200 Sn., depending on the nature of the employment, age of the defective person, the duration of the subnormal vision, and on his individuality (his will to work).

6. An acuity of not better than 20/40 Sn. in the better eye does not cause a loss of 50 per cent. either in efficiency or in earning ability. This degree of acuity, in fact, causes no direct loss to earning capacity. However, its direct influence from two economic points of view must be considered: (1) that of the accumulated effect of these degrees of loss due to repeated injury, and (2) the effect of such degree of substandard vision on the competitive ability.

—K. R. D.

MINERS' NYSTAGMUS. *Med. Jour. Australia, Oct. 10, 1925, vol. 2, pp. 466–467.*

Reference is made in this notice to evidence dealing with nystagmus given by Dr. R. Pittar before the Royal Commission of New South Wales appointed to consider the coal mining industry; and also to the conclusions arrived at by the British committee which recently considered the disease.

Dr. Pittar considers defective illumination the main cause, but attributes influence to cramped posture; he holds that accidents and infection may precipitate the trouble, and that errors of refraction predispose. He considers that affected men should not return to work until fully recovered, which should occur within twelve months. He had seen upward of forty cases. As the coal seams in New South Wales do not entail a cramped position at work, the opinion expressed above on this point receives no support. The British committee considers that errors of refraction are a matter of minor importance, and that affected men should be urged, in their own interests, to return to work as soon as possible. They give infor-

mation which indicates that compensation claims for the disease rise with the economic position of the industry; this has happened in Great Britain where widening the nomenclature of the disease has also greatly increased the claims. In Germany claims fell when compensation was limited to severe cases; in Belgium cases cease with the time limit, six months, fixed for compensation. Neurasthenic symptoms are particularly liable to develop and increase in intensity after all oscillation of the eyeballs has stopped where no limit is placed to the period of compensation. The main interest of this notice is that it contains evidence of the occurrence of miners' nystagmus in Australia.—E. L. C.

Discussion on Miners' Nystagmus at the Royal Society of Medicine, London, Feb. 13, 1925. *Brit. Jour. Ophth., Nov., 1925, vol. 9, pp. 545–592.*

The papers read at this important discussion occupy the greater part of this issue of the *British Journal of Ophthalmology*. No resolutions were passed and although most speakers were in favor of the etiologic importance of light, the personal factor and the psychologic origin of the disease were stressed by some speakers. All the members of the Miners' Nystagmus Committee of the Medical Research Council took part in the debate.

The discussion was opened by Dr. T. L. Llewellyn who described miners' nystagmus as a general disease involving the nervous system with special manifestations in the oculomotor apparatus. The increase in the incidence of the disease is due to (*a*) payment of compensation, (*b*) widening of the definition of the disease, and (*c*) economic stresses since the war. The chief etiologic factor is the deficient illumination found in mines. The personal factor plays an important part in determining incapacity; men with an unstable mental make-up are more liable to become incapacitated than others. Cases of miners' nystagmus may be divided into three groups: (*a*) the largest, showing no evidence of a neurosis; (*b*) a second group showing well-marked signs of miners' nystagmus associated with a neurosis; (*c*) a third group where the neurosis is dominant and the signs of the disease indefinite. The ultimate cause of the nystagmus may be found in failure of dark adaptation which was frequently the case in men suffering from the disease. Treatment consists in improving the underground illumination (*a*) by increasing the candle power of the lamp, (*b*) by bringing the lamp nearer to the working area by use of a cap lamp, (*c*) by the use of shadowless lamps without pillars, (*d*) by the use of tinted, translucent or dioptric glasses, (*e*) by altering the reflecting power of the working places by the use of whitewash or light-colored stone dust, (*f*) by careful lamp maintenance. Once the disease is established the patient should be removed from the mine and, after a rest, found suitable work on the surface until all signs are lost.

Dr. J. S. Haldane spoke of the physiologic aspect of vision in dull illumination. In good illumination the foveal images are sharp and persistent, while the peripheral images fade rapidly out of consciousness when the eye is fixed but reappear on any slight movement. "Now, with very low

luminosity, foveal vision loses completely its lasting character: an object, at first seen, fades rapidly out of consciousness, so that it can no longer be fixed. . . . . The eye wanders about, picking the object up momentarily with the fovea, and losing it again. This must be a very fatiguing process, and it seems to me in all probability the fatigue thus induced is the origin of the ultimate disturbance in ocular co-ordination which constitutes miners' nystagmus." With reference to the hypothesis that miners' nystagmus is due to the gases present in the coal mine, Dr. Haldane is very emphatic: "So far as I can see the action of abnormal gases can have nothing whatever to do with miners' nystagmus."

Dr. H. S. Elworthy laid stress on the quality of the light required and asked for the introduction of color into the mines. He suggested that miners' nystagmus may be due to the exhaustion of the retina by the violet or blue rays. The light given by the electric lamp contains a much larger proportion of irritating rays than the oil lamp or carbon filament. In 1923 the colliery company with which Elworthy is connected began to use "yellow" glasses in the safety lamps. These yellow glasses are said to cut off a proportion of the irritating blue rays and to prevent glare. Since the introduction of these glasses the incidence of the disease has fallen and the men have spoken highly of the benefits received from diminution of glare.

Mr. Eustace Mitton, a colliery engineer of great experience, said he was satisfied that miners' nystagmus was due to the strain of working with inefficient light and gave figures from a group of collieries under his charge showing the reduction in the incidence of the disease after the introduction of electric lamps.

Dr. Millais Culpin, speaking from the psychopathologic aspect of the disorder, said that the incapacity caused by miners' nystagmus was often due to psychoneurotic symptoms. He called attention to the similarity of the disease to the conditions known as war shock and railway spine. Miners' nystagmus shows no difference from the other widely occurring psychoneuroses except in the predominance of one symptom, oscillation of the eyes, which is not constant and is not correlated with the severity of the other symptoms. The miner is always, unconsciously perhaps, thinking about the threat to personal safety which his work entails. The psychologic explanation of the causation of miners' nystagmus covers more of the facts than any other theory and will sooner or later be accepted.

Mr. T. J. Slack, a lamp manufacturer, spoke of the difficulties of making a lamp strong enough to stand the work and light enough for the miner to carry. The 2-volt battery is the worst size from the bulb makers' point of view and experiments are being made which will enable a 4-volt accumulator to be used. Photometric tests of the yellow-tinted glass, which is called Euphos glass in the trade, showed that the absorption was not greater than that of clear glass and that visibility was increased. Probably the Euphos glass used was of a higher quality than the clear glass.

Dr. F. Robson thought that the disease was due either to a direct toxemia from the gases present in the

mine or to an anoxemia from deficient ventilation. Soft or bituminous coal seams produce the most cases of the disease. The neurasthenic element of the disease is due to the action of hydrocarbons on the nutrition of the neurons. Dr. Robson gave extensive figures of chemical analysis of various coals and claimed to have shown that the incidence is greater in seams with high volatility and high hydrocarbon content.

Professor Collis, speaking on the influence of compensation, pointed out the fallacy of using the records of compensation claims as a true index of the incidence of the disease. The disease is an occupational neurosis and as such is named after a manifest symptom. The influence of economic fear is an important factor in times of stress and limited employment. The temptation to remain in receipt of compensation which may be equal to the wages earned when short time is worked accounts for the gradually increasing number of cases continued from previous years. Graphs were shown which brought out the great increase not only of miners' nystagmus but also of all industrial diseases and nonfatal accidents. Comparisons were drawn between the almost universal return to work in Belgium where payment ceases at the end of six months, and the slow rate of return in the United Kingdom where compensation lasts as long as incapacity can be proved.

Mr. G. H. Pooley spoke on the personal element of the disease and described cases at full work with marked oscillation of the eyes. He thought that a general disinclination to work and the condition known as the *maladie imaginaire* of Molière accounted for many failures. He gave a short note on vision in very feeble illumination. Even when this was as low as 0.00006 foot candle, red and green colors could be distinguished by the normal eye and vision was up to 1/72 of normal.—T. L. L.

DISCUSSION ON OCCUPATIONAL DISEASES OF THE EAR, NOSE, AND THROAT, AND THEIR PREVENTION. *Brit. Med. Jour., Nov. 14, 1925, vol. 2, pp. 886–894.*

A number of medical men took part in this discussion which was opened by F. H. Westmacott. He approached his subject by considering how far affections of the ear, nose, and throat occurred in diseases scheduled for compensation. In the case of anthrax, this area is affected only if the pustule is placed on the neck. For lead poisoning, troubles in this area are unusual, but paralysis of laryngeal muscles has been reported. Mercurialism may be manifested by deafness with Ménière's syndrome in addition to tremors and muscular weakness. Phosphorus poisoning particularly affects the jaw, causing necrosis; the path of entry is through bad teeth. Dust of salts of arsenic affect the mouth and throat, but particularly cause destruction of the nasal septum. Dermatitis on the helix and tragus may result from exposure to dust and grime, and also to extreme heat. Dust may also cause catarrh, suppurative disease of the nose, nasopharynx, pharynx, eustachian tubes, and middle ear; a sign of the irritating character of such dust is to be found after years of exposure in absence of vibrissae from the nasal orifices. My-

cosis of the external auditory meatus may occur from exposure to dust of cotton, wool, and other materials, which present an oily or fatty soil in a warm atmosphere for the growth of spores; the tympanum becomes thickened and hearing is impaired. Dust of bichromate of potash, even more than the salts of arsenic, is notorious for causing perforation of the nasal septum, which may occur within a few weeks of commencement of employment; the risk is most pronounced in the manufacture of this salt. Compressed air illness is associated with vertigo and tinnitus, symptoms which are manifested during or after decompression.

Ear trouble may arise from explosions in mining and gunfiring, with rupture of the tympanum, or damage to nerve endings without rupture, giving rise to deafness and vertigo. Boiler-makers and others exposed to loud noises become deaf after years of exposure; these men may hear in the noise in which they work, but lose sensation for high-pitched notes. Evidence favors the view that the principal channel through which the internal ear is injured is through the sound transmitting apparatus of the middle ear and not through other bodily channels. The throat may be affected with chronic laryngitis in street hawkers and those exposed to dust.

The discussion was continued by S. W. Grimwade from the viewpoint of the navy. He found from records that only 3 per cent. of diseases of the ear in the service were directly attributable to the service, *i.e.*, rupture of the tympanum and labyrinthine deafness. Only four cases of concussion from gun practice were seen in nearly two years at the Plymouth Naval Hospital. Both English and French statistics indicate that true gun deafness is uncommon in the navy. Cotton wool plugs are commonly used, but are not compulsory; unfortunately they make the user deaf. The Malloch-Armstrong meatal plug is better, since the wearer can hear ordinary conversation. Most cases of ear trouble in the service are due to previous middle ear disease; these cases might be eliminated by more careful medical examination of recruits.

The next contributor was D. Ranken of the air service. Nasal obstruction and mouth-breathing are troublesome at high altitudes; pyorrhea is also to be condemned. Eustachian obstruction, which makes equalization difficult, may during a rapid descent cause vertigo, nausea, or even fainting; any condition likely to cause eustachian obstruction is objectionable in a flying officer. Alterations in atmospheric pressure during flying do not cause symptoms similar to those which follow too rapid decompression. Deafness caused by the reiterated crack of the exhaust and from testing aeroplane engines is entirely temporary; but meatal plugs are of value as a protection.

T. J. Faulder spoke from experience in the army. Various aural disabilities at the Ministry of Pensions numbered 31,750; but all were not caused by conditions of service. They do, however, exhibit the presence in the civil population of a vast amount of ear and nose trouble. Cases of ruptured tympanum from gunfire did occur, but were not frequent. Prolonged and excessive overstimulation is needed to cause permanent deaf-

ness; these conditions are unusual in the army. Men with old perforations were less affected by noise than those with normal ears. Ear plugs are only necessary when guns are being worked in an enclosed space; moreover, most men dislike them. The information available from recruit examinations as to the prevalence of ear, nose, and throat troubles is uncertain, giving estimates varying from 2 to 10 per cent. of men examined who were declined on this account. Much still remains to be done in childhood to remove the conditions which lead to so much disability in adult life; they cause far more trouble than accrues from injuries during service.

The last speaker was T. R. Rodger who described his observations among boiler-makers. Depreciation for low notes comes first, even among youngsters employed for less than ten years; the loss of hearing for high notes affected men employed over thirty years. Animal experiments conducted by others have shown that the mechanism of the internal ear can be damaged by repeated detonation. Dr. Rodger also held that injury to the cochlea is conveyed by air conduction and not by bone conduction. Ear plugs are the only hope for men exposed, like boiler-makers, to great noises over prolonged periods of time. —E. L. C.

INDUSTRIAL PHYSIOLOGY: NUTRITION, METABOLISM, FATIGUE, ETC.

A Plea for Prolonged Resuscitation. *Nat. Safety News, Oct., 1925, vol. 12, p. 30.*

A letter from Mr. S. E. Whiting, Chairman of the Electrical Section, American Association of Safety Engineers-Engineering Section, National Safety Council, is here reproduced which supports the opinion that when the patient has been pronounced dead by the physician or the medical examiner, the first aider should continue artificial respiration until breathing is restored or *rigor mortis* sets in.

Five cases are cited in which men were pronounced dead by physicians and then were brought back to life by laymen trained in resuscitation.—M. C. S.

A Physiological and Economic Study of the Diets of Workers in Rural Areas as Compared with Those of Workers Resident in Urban Districts. *A. B. Hill. Jour. Hyg., Oct., 1925, vol. 24, pp. 189–240.*

This comprehensive report is a valuable contribution to the vexed question of urban and rural diets. The author has entered carefully into the variable factors which always make collections of data of this type difficult of comparison and has apparently narrowed his investigation into those channels which have the least probable error.

The rural investigation centered in Essex. An analysis of the dietary studies here indicated an average daily consumption per man of 2,872 calories, which is below the requirement (3,300 calories) of the average agricultural worker. Only 17 per cent. of the families secure over 3,300 calories per man per day. The value of the diet in calories of these rural

workers varied with the income, ranging from 2,467 calories per man per day for an income of 4s. to 5s. per week to 3,350 for an income in excess of 10s. An analysis of expenditure—housing and rentals, clothing, etc.—was made.

Comparison of the Essex investigation with previous investigations extending as far back as Dr. Edward Smith's report of 1863 discloses the fact that the consumption of breadstuffs among rural workers has decreased, while the consumption of sugar (including jam and treacle) has increased enormously. The consumption of fat has increased considerably. Meat consumption has remained the same, milk is used by more families, and cheese, which was consumed by 57 per cent. of the families in the 1863 report, is now used by 98 per cent. of the families studied in the Essex report. A comparison of the agricultural worker with the urban worker indicates that the former "*in proportion to his wages*, secures a diet of higher calorie value than that of the town worker, but he only secures this value (1) by a smaller purchase of animal protein and by a relatively greater consumption of carbohydrates to compensate for a smaller consumption of fats; (2) by spending a greater percentage of his income on food; (3) by increasing his hours of work to produce home-grown food; and (4) perhaps by more careful marketing. The actual value of his diet, leaving income out of account, is *superior to that of the lower paid urban labourer*, but, on the whole, *below that of urban skilled workers*—and the agricultural labourer (or, at the very least, the higher grades such as stockmen) must be considered as a skilled worker."

Anthropometric measurements of schoolchildren in each type of area indicate that the physique of the Essex children is better, age for age, than that of urban children living on a diet equivalent or superior in energy value. The author points out, however, that other factors—especially the "racial" and "fresh air and sunlight" factors—must exert an influence, so that the efficacy of diets cannot be satisfactorily measured by a comparison of heights and weights.—L. T. F.

Basal Metabolism as Affected by Atmospheric Conditions. *W. J. McConnell and C. P. Yagloglou. Abstr. as follows from Arch. Int. Med., Sept., 1925, vol. 36, p. 382, in Jour. Am. Med. Assn., Oct. 31, 1925, vol. 85, p. 1427.*

The results of the experiments made by McConnell and Yagloglou lead them to the following conclusions: The rates at which oxygen is consumed and carbon dioxide is produced increase with exposure to either high or low temperatures. There is a zone of minimum metabolic rate between 75° and 83° effective temperature within which basal metabolism should be measured. The metabolic rate increases rapidly when the temperature of the environment is higher than that of the body. Body temperature and pulse rate correlate fairly well with the rate of basal metabolism.—K. R. D.

Studies in Repetitive Work with Special Reference to Rest-Pauses. *S. Wyatt and J. A. Fraser. Indust.*

Fatigue Res. Board, Rep. No. 32, pp. 39. H. M. Stationery Office, 1925.

This investigation is based on close observation of sixteen industrial workers for periods aggregating fifteen weeks. Eight of the women concerned were folding handkerchiefs, while four were hand ironing, and four were working mechanical presses which stamped out cigarette tin lids from tin sheets. Observations of output were made at short intervals throughout the work spells, and all the causes of delay, whether voluntary or involuntary, were noted down. The handkerchief folders and the ironers had a ten-minute rest pause in the middle of their morning spell of work, and after they had been subjected to investigation for two or three weeks, an additional ten-minute rest was introduced in the middle of the four and one-quarter-hour afternoon work spell. The stamping press women, who were working five-hour spells both in the morning and in the afternoon, at first had no rest pauses at all, but after a fortnight's trial under these conditions a ten-minute rest was introduced in each spell. In each of the three instances the introduction of the rest caused an increase in the rate of working, the improvement varying from 1.5 to 8 per cent., and even after allowing for the productive time lost in taking the rests, the total output showed an increase of 2 per cent. in two instances, though there was a small loss (0.7 per cent.) in the third instance. Hence the favorable influence of the rest pauses was not so great as that usually observed: *e.g.*, Vernon and Bedford, when testing larger groups of workers engaged on similar industrial processes for periods of several months, observed an improvement of 5 to 10 per cent. The apparent discrepancy is due to the fact that after the introduction of a rest pause the workers take several months before they show the full response. In consequence of the increased vigor resulting from the rests, they unconsciously get into the habit of working somewhat more rapidly, and of taking shorter voluntary rests from their work; but such a change of habits is acquired but slowly. That the introduction of the rest pauses did have a subjective effect is proved by the fact that all of the operatives approved of them, and volunteered such remarks as "The work is not so depressing," and "I feel less tired at the end of work."

The observations showed that the group of handkerchief folders fluctuated considerably in their rate of work at the beginning of the spell, but they gradually got steadier during the first two hours, and then, as fatigue and boredom developed, became more erratic and reached their maximum variability at the end of the spell. After the introduction of the rest pause the fluctuations were smaller than before, and did not rise rapidly until the last half hour of the work spell. Again, the observations showed that the women who worked in close proximity influenced one another's activities to a pronounced degree, and for this and other reasons it was concluded that in any compact group of workers a few specially dependable and efficient operatives should be included, so as to stimulate the more indifferent workers to maintain a higher standard of efficiency.—H. M. V.

INDUSTRIAL SANITATION: FACTORY CONSTRUCTION, ILLUMINATION, VENTILATION, HEATING, WATER SUPPLY, SEWAGE DISPOSAL

HYGIENE AND INDUSTRY. *S. Tatchell. Jour. Roy. San. Inst., Nov., 1925, vol. 46, pp. 231–237.*

The author, an architect, points to the unhygienic premises provided for clerks as well as for industrial workers, and quotes a statement that sickness costs the country ten times more than the cost of strikes. A description is given of an up-to-date factory built of ferro-concrete with central heating, roof lighting, natural ventilation supplemented by fans; with cloakrooms and lavatories; with floors of dustless cement; and having vacuum cleaning installed. He then describes modifications needed in a century old printing house, whence accumulations of dirt and lumber had to be removed, until finally the premises lent themselves to an enormously increased output. Recreation schemes, particularly for mines, are praised, and the importance is stressed of co-operation between hygienists and architects.—E. L. C.

AN APPARATUS FOR THE DETECTION OF AIR MOVEMENT. *R. C. Frederick. Abstr. as follows from Analyst, 1925, vol. 50, pp. 399–400, in Chem. Abstr., Oct. 20, 1925, vol. 19, p. 3040.*

By gentle pressure on a blowing bulb, a stream of air is divided so that half of it passes through asbestos wet with concentrated hydrochloric acid and the other half through asbestos wet with strong ammonium hydroxide. The air streams are united and a continuous cloud of ammonium chloride results, which may be used in the study of ventilating conditions.—P. D.

RELATIVE VALUES OF METHODS OF ENUMERATING BACTERIA IN AIR. *W. J. McConnell and B. G. H. Thomas. U. S. Pub. Health Rep., Oct. 9, 1925, vol. 40, pp. 2167–2178.*

The authors compare a number of different methods for determining bacteria in air. Bacillus coli and staphylococcus albus were sprayed into a hood, the air of which was kept in motion. The air was then sampled through the various apparatus at measured rates. To reduce errors of comparison the different apparatus were run together and alternately.

A water aeroscope, found to be satisfactory, is described in detail. Essentially it consists in a 3 x 10.5-cm. bubbling tube covered at the bottom by silk and joined to a 6-mm. tube at the top. This bubbler is placed within a glass cylinder, 25 c.c. of water are added and air is bubbled through at 0.4 cubic feet per minute. One cubic centimeter of the water is then cultured and colonies determined in terms of the total volume of air passed through. This same rate of flow, *viz.*, 0.4 cubic feet, was used on all methods except the impinger which sampled 1 cubic foot per minute.

Paper filters, sand filters, the Greenburg-Smith impinger, and sugar filters were compared with the water aeroscope with the following results:

1. The modified water aeroscope is approximately ten times more efficient than the standard sand method. It is relatively free from error and contamination and is easily prepared.

2. The Anderson-Armspach (filter paper) dust determinator is approximately ten

times more efficient than the standard sand method, but is open to errors through contamination, and the method of preparing the filter paper is quite tedious.

3. The experiments conducted with the impinger indicate that this instrument is not suitable for enumerating the bacteria in air when the rate of flow is 1 cubic foot per minute.

4. The sugar tube is impractical as an aeroscope.

The authors suggest that the violent impinging action in Greenburg and Smith's device kills most of the bacteria so that the indicated efficiency is low.—P. D.

INDUSTRIAL SERVICE AND MUTUAL BENEFIT ASSOCIATIONS

EMPLOYE SERVICE OF MACHINERY CO. WELL-EQUIPPED FIRST AID DEPARTMENTS AND PENSIONS FEATURE OF SULLIVAN PLANTS AT CLAREMONT, N. H., AND MICHIGAN CITY, IND. *E. Murray. Hosp. Management, Sept., 1925, vol. 20, pp. 62–63.*

Of special interest in this article are the plans for pensions and disability and sickness benefits. The pension plan includes male employees 60 years or over employed for twenty years or more; those 55 to 59 years employed twenty-five years or more; those less than 55 years employed for thirty years or more. Employees who have been with the company fifteen years or more, if totally disabled by sickness, are granted a disability pension. The pension in all of these cases is 1 per cent. of the average annual wage for ten years multiplied by the number of years of the worker's term of employment. Female employees are entitled to similar pensions five years younger than the men.

Total accident disability and partial disability benefits are full pay for thirteen weeks, half pay for the remainder of the disability, not to exceed six years. After six years in cases of total disability the committee may provide additional payments not exceeding $20 weekly at its discretion.

Sickness benefits for employees of ten years' standing or more are full pay for thirteen weeks and half pay for thirty-nine weeks; for those in the company's service five years or more, full pay for thirteen weeks and half pay for thirteen weeks; for those in the service two years or more and less than five, full pay for four weeks and half pay for nine weeks.

These benefits are maintained wholly by the company without payment by the workers.—M. C. S.

SICK LEAVE AMONG NEW YORK OFFICE WORKERS. *Abstr. from publication of The Merchants' Association of New York, in U. S. Month. Labor Rev., Sept., 1925, vol. 21, pp. 598–599.*

A survey of the current practice in New York City in the treatment of office employees absent because of illness was recently made by the Merchants' Association of New York. Replies to their questionnaire were received from seventy-two representative concerns.

Usually employees are given full pay during sickness, but thirteen firms reported that after full pay has been allowed for some time part wages are paid. Only a few firms make any deduction from the regular vacation period because of time lost on account of illness.

In thirteen firms which have fixed rules as to the payment of salary for absence due to illness the amount of leave granted depends upon the period of service. One insurance company gives no salary for absence during the first year of employment except in special cases, but after one year's service one month's sick leave is allowed, increasing up to six months' full pay and six months' half pay after fifteen years' service. Another company pays during the first year for acute sickness only, but thereafter allows the full salary and, in cases where illness lasts for more than two weeks, an additional sickness allowance not to exceed 50 per cent. of the salary; certain allowances are also made for surgical operations. A cumulative plan is in force in another company by which employees are credited with accrued sick leave. If an employee's absence exceeds the time for which full salary benefits are allowed, further payments are made at a "pension rate." This amounts to 20 per cent. of the salary for employees in the company's service for five years and increases 1 per cent. annually up to fifteen years of service and thereafter 2 per cent. annually until, after twenty-five years' service, the maximum pension of 50 per cent. of the salary rate is paid.—M. C. S.

Social Workers in Factories. *Paris Letter, Jour. Am. Med. Assn., Oct. 31, 1925, vol. 85, p. 1413.*

This letter discusses the activities of social workers in French factory communities. The social worker, it says, guarantees good order and discipline, proper management of the milk distributing station, the consultation service for nursing mothers, the crèches, the day nursery, the canteen, the rest room, and other enterprises accepted or introduced by the factory management, the value of which depends on the way they are managed. Prepared by her studies in the school for nurses and by long service in the hospital, the social worker co-operates with the medical service in the crusade against infant mortality, tuberculosis, syphilis, cancer, and occupational diseases. She visits the families of the women employees, learns their aspirations, assists them socially and trains them in hygiene and right ways of living in general.

The social worker is familiar with the resources of public and private aid: the legal provisions concerning large families, lying-in women and nursing women, and sees to it that those in her charge get the benefits of these provisions. Her moral influence is great, and the social worker knows also how to make herself beloved.

The training school for these social workers is located in Paris, 43 Rue Pernety (XIV). The management is as solicitous as to the general character and moral worth of the students as it is in regard to their formal training. Of sixty-seven applicants for admission, only ten were accepted. The school finds places for its graduates, and they are paid by the industries or administrations that employ them. Their initial salary is 8,400 francs.

The careful selection of applicants and the judicious placing of graduates explain the unanimous satisfaction expressed by the establishments that have employed these social workers. There are now 177 social workers in factories and like positions.—K. R. D.

INDUSTRIAL WELFARE. *A. Johnston. Jour. Roy. San. Inst., Nov., 1925, vol. 46, pp. 238–241.*

The article is contributed by an important employer, who writes on the undoubted value to industry of welfare work. The rise of the movement is stressed, until now about 1,000 firms are carrying on organized welfare activities. Engagement is undertaken through the welfare worker, whose duties are helped by welfare committees. In this way the safety habit is inculcated, thrift is encouraged, and health improved. A factory spirit is worth encouraging on the sports ground as well as in working hours; it helps to remove artificial barriers between man and man, and between employers and wage-earners.—E. L. C.

INDUSTRIAL HEALTH LEGISLATION: COURT DECISIONS: WORKMEN'S COMPENSATION AND INSURANCE

THE LEGAL AND ETHICAL ASPECTS OF COMPENSATION TO WORKMEN IN GREAT BRITAIN. *J. Glaister. Paper Read at Fourth International Congress on Industrial Accidents and Diseases, Amsterdam, 1925. Pamphlet Published by Nederl. Tijdschr. v. Geneesk., 1925, pp. 33–50.*

To write an abstract of an epitome is never easy but this is doubly difficult in the present case as Professor Glaister's valuable paper gives in a comprehensive but condensed form the best synopsis which has yet appeared on this subject.

A workman in Great Britain may claim compensation for an accident under either: (*a*) common law; (*b*) the Employers' Liability Act, 1880; or (*c*) the Workmen's Compensation Act, 1906 to 1923. Most of the civilized world of today has operative compensation laws.

Liability of Employers to Workmen for Injuries.—The Workmen's Compensation Act of 1923, Section 7, gives special advantages to the workman. In case of a serious accident the employer is held responsible; thus, notwithstanding that the workman was, at the time when the accident happened, acting in contravention of any statutory or other regulation applicable to his employment, or of any orders given by or on behalf of his employer, or that he was acting without instructions from his employer, if such act was done by the workman for the purposes of and in connection with the employer's trade or business.

A summary of the Workmen's Compensation Acts in prescribed form must be kept posted in a conspicuous place. Notice of the accident is deemed to have been given if the employer or his representative has knowledge of its occurrence (Subsection 3). Subsection 4 provides that a special book be always accessible in which the injured workman or his representative *may* record the particulars of an accident.

Ethical Considerations.—These compensation acts have compelled an expenditure by the employers of some millions of pounds sterling. They operate mostly in favor of the worker. The burden of disproving a fraudulent claim falls on the employer.

Statistics have shown that accidental injuries are more prevalent in persons over 45 years of age than in

younger persons. Employers of labor should know any initial defects of a personal kind in those whom they engage. The employer has the right to choose those whom he will employ, and if a person so employed proves unfitted for the work set him to do, his services may be dispensed with.

All workers in occupations in which industrial diseases may and do arise ought to have one factor in common, *viz.*, that at the time of adventuring on the employment they should be in good physical health, and should continue so to remain while in this employment.

The decision of the House of Lords on appeal that any personal defect or disease in a workman at the time of injury or death—defect or disease which may indeed be directly contributory to or actually invite the injury or death—is no bar to compensation by his employer, opens a very large question for employers of labor. This decision in the case of Hughes *v.* Glover, Clayton & Company—in which a workman engaged in tightening a bolt or nut with a spanner was seen to slip, fall, and, when picked up, was found to be dead, *postmortem* examination showing the cause of death to be a ruptured aneurysm of the aorta—that the relatives were entitled to compensation, indicated that the duty of ascertaining the workman's fitness lay upon the employer.

The time has come when standards of fitness for employment should be established, as has already been done to some extent and is being developed in the United States of America, so far as physical health is concerned.—D. A. C.

INDUSTRIAL MORTALITY AND MORBIDITY STATISTICS

ANALYZING THE HEALTH AND ACCIDENT RECORDS OF A DECADE. *H. W. Moses. Nat. Safety News, Dec., 1925, vol. 12, pp. 13–16.*

The author quotes the experience of The Edison Electric and Illuminating Company of Boston. Data similar to those which he gives appeared in THIS JOURNAL (1924, vol. 6, pp. 81–101) and they are therefore not repeated here.—M. C. S.

ABSTRACT OF THE LITERATURE OF INDUSTRIAL HYGIENE

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GENERAL

THE EXHIBIT OF THE BUREAU OF INDUSTRIAL HYGIENE OF NEW YORK STATE DEPARTMENT OF LABOR. *N. Y. State Dept. Labor, Indust. Hyg. Bull., Oct., 1925, vol. 2, pp. 13–14.*

The chief features of this industrial hygiene exhibit are: a collection of injurious and noninjurious dusts; wax models illustrating the most important industrial diseases such as lead poisoning; glass transparencies showing the pathologic effects of injurious dusts; photographs showing various conditions which, without proper surveillance, would be injurious to workers and would constitute an economic loss; and various devices used in studying industrial conditions.

This exhibit is available on application.—M. C. S.

INDUSTRIAL MEDICINE *Koelsch. München. med. Wchnschr., Nov. 20, 1925, vol. 72, pp. 2027–2029; Nov. 27, 1925, pp. 2068–2070; Dec. 4, 1925, pp. 2117–2119.*

This is a review of industrial hygiene literature which appeared in 1925 and contains references to articles on the general aspects of industrial medicine; the physiology of work; sanitation; industrial injuries; dust and

poisonous hazards; infectious and systemic diseases; affections of the skin; and the hygiene of specific occupations.—M. C. S.

RELATION OF PUBLIC HEALTH WORKERS TO INDUSTRIAL HYGIENE. *J. W. S. McCullough. Am. Jour. Pub. Health, Nov., 1925, vol. 15, pp. 984–985.*

Recent activities evidence an effort to bring the health of industrial workers into closer relation with general public health activities. This must be done keeping in mind the facts that the move for development of medical supervision of health of the workers must come from industry itself and that industry, constituted as it is, considers economic values of first importance. Public health workers, being outside the influence of private practice relationships, can best make this connection, and the full-time health officer with clinical training is the one best fitted.—B. L. G.

A FUTURE DEVELOPMENT IN INDUSTRIAL HYGIENE. *D. C. Parmenter. Am. Jour. Pub. Health, Dec., 1925, vol. 15, pp. 1050–1052.*

An opening has appeared in industrial hygiene for the study of the newer or preventive medicine through the physical examinations of the individuals comprising the groups of industry, beginning with the executive and continuing on down. Through the physical examination the medical profession has an unusual opportunity for studying incipient diseases and for practising real preventive medicine on groups and on individuals over a period of time sufficient to check up results.—B. L. G.

INDUSTRIAL HYGIENE. *H. Kerr, T. Oliver, A. Watson, and B. L. Lelliott. Pub. Health, Feb., 1925, vol. 39, pp. 134–143.*

This discussion was opened by a medical officer of health, Prof. H. Kerr, who pointed out that the occupational hours of life were too little within the influence of the health service, and that the local authorities could supervise overcrowding, ventilation, light, and other sanitary matters better than the too small staff of expert factory inspectors. He asked for closer touch with welfare organizers, and put in a plea for better conditions for clerks.

Sir T. Oliver sketched the growth of public health supervision, particularly in industry. Much has been done to lessen occupational risk, *e.g.*, from plumbism, phosphorus necrosis, and accidents. Still occupation often exerts an adverse influence on physique. Work is service rendered to humanity and should be possible without risk to health. More medical supervision, particularly on entry to employment, is required in order to mate happily the work to his worker.

A. Watson spoke as an employer of the value of the well-being of workers to industry. Obsolete and inefficient sanitation is not economic. A trade which cannot be carried on under healthy conditions should not be carried on at all. Monotony can be lessened by change of work, or even by community singing. Works councils are invaluable to meet minor complaints and defects in organization. A supply of good food at cost price is a factor to success. A dental clinic by improved health pays its way. An annual holiday with wages is a

sane proposition, which a holiday cottage in the country assists. A record card for each worker is invaluable, with notes of wages, absences, and progress. Each concern should insure against unemployment and so avoid state intervention. Overtime, which is undesirable, may be needed in order to avoid taking on in times of rush temporary workers who have later to be dismissed. Profit sharing is commendable and an incentive to good work. The post of welfare organizer is today a practical necessity. Material prosperity is bound up with a healthy and so a contented personnel.

B. L. Lelliott, a welfare supervisor, wound up the set of papers. He claimed that some 2,000 English concerns now have welfare departments doing health work, wider in scope than present day legislation. Hygienic conditions come first in a health campaign. Engagement is of great import, but here far more assistance should be asked from the medical profession for determining physical fitness and recognizing defective vision and hearing, unhealthy teeth, or heart trouble. The ambulance room should supply data as to accident occurrence and sickness, and thus enable risky processes to be spotted. Lighting calls for special attention. Tidiness and cleanliness in workshops is associated with tidy and clean workers. Education as to proper use of welfare facilities is required, but is quickly absorbed. Closer collaboration is wanted with school medical service to help vocational guidance.—E. L. C.

Report of the Institute for Science of Labour, July, 1921–June, 1925. *Kurasiki, Japan, Oct. 5, 1925, pp. 35 and illustrations.*

This report is devoted chiefly to a discussion of the scope and methods of investigation and to a summary of the publications of the Japanese Institute for Science of Labour during the four years of its existence. Most of the investigations have been on the subject of industrial fatigue and efficiency for the purpose of studying the effects of (*a*) environmental conditions and (*b*) personal factors. A list of the articles published is appended.—M. C. S.

SYSTEMIC OCCUPATIONAL DISEASES: OCCURRENCE, TREATMENT, AND PREVENTION

Functional Nervous Disorders. *H. W. Stevens. Abstr. from The Commonhealth (Jordan Marsh Company), April-May-June, 1925, vol. 12, p. 37, in Am. Jour. Pub. Health, Dec., 1925, vol. 15, p. 1122.*

In a group of store workers numbering about 4,000 in a six months' period, the diagnosis of functional nervous disorder was made 506 times—these disorders being fourth in order of frequency among the complaints treated in the store health department. During the same period 1,546 days were lost from these disorders by 123 individuals. The author does not feel that ignoring the facts is a remedy; neither is fear. In attacking the problem in practical ways, close attention must be given to the individual

case, particularly to things in the personal history which are unnerving to the individual; then attention should be given to environment.

OCCUPATIONAL AGGRAVATION OF HEART LESIONS. *Von Schnizer. Med. Klin., Nov. 27, 1925, vol. 21, p. 1810.*

POISONOUS HAZARDS AND THEIR EFFECTS: GASES, CHEMICALS, ETC.

GAS HAZARDS IN STREET MANHOLES. *S. H. Katz, E. G. Meiter, and J. J. Bloomfield. U. S. Bur. Mines, Rep. Investigations, Serial No. 2710, Oct., 1925, pp. 20.*

This report is summarized as follows:

The atmospheres in 15 manholes at Pittsburgh, Pa., and 12 at Philadelphia, Pa., suspected of being gaseous, were tested. Some of the holes contained city gas which had leaked into the holes from distributing mains. The natural gas distributed at Pittsburgh is nonpoisonous, provided no artificial gas is added, but large volumes may suffocate workers in unventilated manholes by displacing the air; such accidents have happened. Manufactured fuel gas distributed at Philadelphia is high in carbon monoxide, which is poisonous; small amounts render the air in manholes unfit to breathe.

Gassy manholes require thorough and continuous ventilation to insure safety to workers. A hand-operated rotary blower, similar to a forge blower, with canvas pipe leading to the bottom of the hole is serviceable.

Tests were made for CO with palladium chloride test papers, which change from yellow to gray or black when moistened and exposed to 0.25 per cent. or more of CO for five minutes; this simple test shows presence of very dangerous amounts of CO such as will quickly overcome a man, but it is not sensitive enough to indicate lesser amounts which will affect a man more slowly. The iodine pentoxide or hoolamite indicator for CO gave color changes from light gray to bluish gray when 0.07 per cent. or more CO was present, and is a better indicator than the test papers, for CO in concentrations which may affect men.

Tests for explosive gas mixtures were made at the holes with a gas bomb constructed of a 2 by 2 by $\frac{3}{4}$-inch pipe tee, reducers, stop-cocks, and an automobile spark-plug in the $\frac{3}{4}$-inch opening. Gases from the hole were transferred to the bomb with a rubber hand bulb and tubing, and sparked by means of two dry cells and an automobile spark coil. Explosions were indicated by a kick on a pressure gage on the bomb.

Explosive gas mixtures were found in one hole at Pittsburgh and two at Philadelphia.

The hose mask is recommended for use in manholes when respiratory protection is necessary.

—P. D.

NON-FATAL CARBON MONOXIDE POISONING. *B. J. Alpers. Am. Jour. Med. Sciences, Sept., 1925, vol. 170, pp. 390–393.*

Practically all the cases of carbon monoxide poisoning reported up to the present time have died very shortly after exposure to the gas. It is interesting, therefore, to report a case in which death did not result. A careful study of it makes possible a closer correlation of clinical and pathologic findings and reveals where and to what extent certain brain areas are affected, and also whether there is a progressive degeneration of these areas. While there were symptoms and signs of involvement of the lenticular nuclei, not

all the findings can be explained on the pathology of this area though most of them are explainable on this basis.—B. L. G.

THE ELIMINATION OF CARBON MONOXIDE FROM THE BLOOD. *W. C. Stadie and K. A. Martin. Jour. Clin. Investigation, Oct. 20, 1925, vol. 2, pp. 77–91.*

This article is summarized as follows:

An equation is derived showing the relation between hemoglobin, oxygen, carbon monoxide and pH at equilibrium.

Experiments in vitro are given substantiating the equation.

By means of this relation it is possible to predict the effect of increasing acidity on the elimination of CO from asphyxiated animals. It is shown that increasing hydrogen ion concentration in itself will hasten elimination regardless of the ventilatory rate. Experiments on dogs showed this to be so.

It is further shown by the equation that the oxygen dissociation curve of hemoglobin is altered by carbon monoxide. Accepting the hypothesis that carbon monoxide is in itself completely non-poisonous, the altered curve shows that even though twice or three times the physiologic requirements of oxygen are present in the blood there is a marked lowering of the partial pressure of oxygen in the capillaries. This conceivably depresses the rate of diffusion of oxygen to the tissues, thus causing anoxemia.

SKIN ABSORPTION OF CERTAIN GASES. *D. C. Walton and M. G. Witherspoon. Jour. Pharmacol. and Exper. Therap., Nov., 1925, vol. 26, pp. 315–324.*

After stating that the development of mine rescue apparatus and improvements in the gas mask may lead to men exposing their bodies for prolonged periods of time to high concentrations of gases and after citing recent literature to show that high concentrations of gases are often met with, a description is given of experiments which were conducted at the Edgewood Arsenal in order to determine the extent of skin absorption of certain gases.

The hydrogen cyanide used was 97 per cent. pure, the impurity being water. The experiments with this gas were performed under hoods which were provided with an unusually powerful draft and the animals were exposed with their heads outward so as to prevent their inhaling any of the gas. It was found that this gas is absorbed by the skin of dogs and of guinea-pigs. Whether or not the outcome is fatal depends on the concentration of the gas.

Pure hydrogen sulphide gas was used in experiments on guinea-pigs and was found to be absorbed by the skin. It is lethal only when large areas of the skin are exposed.

Carbon monoxide does not appear to be absorbed by the skin.—B. L. G.

PHYSIOLOGICAL EFFECTS OF VAPORS FROM A FEW SOLVENTS USED IN PAINTS, VARNISHES AND LACQUERS. *H. A. Gardner. Paint Manufacturers' Assn., Scientific Section, Circ. No. 250, 1925, pp. 89–149.*

This report contains details of animal experiments showing the physiologic and pathologic effects of inhaling vapors of the following common organic solvents used in the paint and varnish industry:

1. Highly refined steam distilled wood turpentine.
2. Crude unrefined steam distilled wood turpentine.

3. Steam distilled wood turpentine without chemical treatment and containing aldehydes.
4. Destructively distilled wood turpentine.
5. Pure gum spirits of turpentine.
6. Refined steam distilled wood turpentine.
7. Petroleum distillate (volatile mineral spirits).
8. Dipentine.
9. Butanol (butyl alcohol).
10. High boiling distillate from coal tar solvent naphtha 160°C.
11. Benzol.
12. Furfural.

Each animal (rabbit) was kept in an enclosed cage containing an open dish of the solvent and a suspended sponge soaked in solvent. Charts accompany each protocol showing length of exposure (about seventy days), changes in weight, and variations in red and white blood counts. At the end of the exposure the animal was autopsied and the pathologic findings noted.

The author's conclusions are as follows:

In summing up the results of this investigation and taking into consideration the results of practical experiences in the industry, it is considered safe to state that paint and varnish products thinned with mineral spirits, pure gum spirits of turpentine, or highly refined steam distilled wood turpentine, are non-toxic from the standpoint of vapors of the solvent used. It is also probably safe to state that lacquers made with such solvents as amyl acetate, butyl acetate, toluol, and alcohol, or even furfural, are not dangerous to apply where ordinary ventilation is present. It is suggested, however, that benzol be replaced in lacquers with higher boiling homologues.

If, as in the past, products which contain pigments of a supposedly poisonous character can be safely used in industrial establishments, through the installation of proper ventilation, spray hoods, and sanitary devices of various kinds, as well as the observance of hygiene among the workmen, it would be suggested that products containing even benzol might be safely handled, if proper precautions of a similar nature are observed. Moreover, it is probable that the important consideration in connection with these materials is their possible effects at the dilutions in which they are used and their concentration in the air in factories where they are applied. Under these conditions, they might not be dangerous.

Elsewhere the author urges the substitution of the higher boiling homologues of benzol wherever possible. He indicates that such substitution is often entirely practical in the paint and varnish trade.

This suggestion is in agreement with that of the National Safety Council's Benzol Committee (see THIS JOUR., 1926, vol. 8, Abstr. Section, p. 73). The author's work and report are done independently of this Committee and were published before the Committee's report although the present abstract follows that of the Report of the Benzol Committee.—P. D.

GAS MASK FOR PROTECTION IN AIR AGAINST ALL GASES, VAPORS AND SMOKES. *A. C. Fieldner, S. H. Katz, H. W. Frevert, and E. G. Meiter. U. S. Bur. Mines, Rep. Investigations, Serial No. 2719, Nov., 1925, pp. 10.*

The mask tested is known as the all-service mask (Mine Safety Appliances Co., Pittsburgh) and was approved by the United States Bureau of Mines for protection from all classes of poisonous vapors, gases, and smokes *in air*.

The mask is described and illustrated in detail. The contents of the canister, arranged in the order in which

they are encountered by the entering air, are as follows: (1) activated charcoal impregnated with copper sulphate; (2) activated charcoal, not impregnated; (3) caustite, a caustic soda preparation; (4) filter of cotton wool; (5) anhydrous calcium chloride; (6) hopcalite (an oxidizing mixture); (7) anhydrous calcium chloride; (8) filter of cotton wool.

This mask was found by man test and by chemical and physical tests to give perfect protection for about two hours against small amounts of:

A. Acid gases like chlorine, formic acid, hydrogen chloride, hydrogen cyanide, hydrogen sulphide, and sulphur dioxide.

B. Organic vapors like acetone, aniline, benzene, chloroform, formaldehyde, and gasoline.

C. Ammonia gas.

D. Carbon monoxide.

E. Smokes, dusts, and mists (of comparatively coarse texture).

The mask is equipped with a timing device so that the wearer can tell when the protective chemicals are exhausted. The canister weighs about $3\frac{1}{2}$ pounds. The authors emphasize the fact that the mask is intended only for use in air containing an adequate supply of oxygen—*viz.*, 16 per cent. or more—and will protect against 2 per cent. or less of all gases but ammonia, where 3 per cent. is permissible.—P. D.

METHODOLOGY OF THE STUDY OF WORKING CONDITIONS IN WORKROOMS WHERE WARM METAL WORK IS DONE. *L. Feinberg. Gigiena Truda, 1925, no. 7, pp. 3–16.*

The author investigated the working conditions in several forge works in Moscow. The factors which he considered the most injurious were: the extremely high, variable temperature, the intensive effect of the direct heat, the significant carbon monoxide and sulphur dioxide content of the air—0.15 to 0.37 mg. per liter, and 0.1 to 0.14 mg., respectively—and the severe muscular exertion.

Observations on the changes in the physiologic functions of twenty-four workers before and after work gave the following results: The average loss in weight during four hours of uninterrupted work was 1.107 kg.; the average rise in body temperature, 0.67°C.; the average acceleration of the pulse, 22 beats a minute. The blood pressure (maximal) showed a tendency to drop during work in about two-thirds of the workers examined; this was, however, not constant or significant (11 mm. Hg). In six out of ten workers whose hemoglobin content was observed before and after work the percentage was always reduced (on an average, about 5.7 per cent.), in one worker always increased, in two unchanged, and in one the results varied.

On the basis of his own observations and of experiments on the physiology of sweating carried out in the Hamburg Physiologic Institute, the author raises the question whether it is not possible to use the observations on the changes in the biophysical properties of the blood, especially of the hemoglobin, before and after work, as proof of a disturbance of the water balance in the organism of the worker, especially in the blood, and indirectly as proof of an imminent disturbance of the heat regulating mechanism.—M. C. S.

BRASSFOUNDERS' AGUE. *A. Burstein. Gigiena Truda, 1925, no. 7, pp. 17–41.*

The author carried out a series of experiments on animals and on men (himself included) in order to investigate various questions relating to brassfounders' ague.

The feeding of zinc in the form of zinc oxide and zinc dust to rabbits, as well as the inhalation of zinc fumes, had no pyrogenic effect. The subcutaneous and intravenous injection of zinc preparations in an average dose of 30 mg. per kilo of body weight, however, caused a rise in temperature. Analogous experiments with other metals gave no positive results.

The inhalation of zinc oxide in the form of very fine dust by the author and two of his colleagues caused typical brassfounders' ague of varying intensity. A third colleague, who wore a respirator during the experiment, escaped poisoning. The average dose per kilo of body weight of the zinc oxide inhaled in these experiments was 1 mg.

Experiments *in vitro* on the solubility in water of zinc oxide which had been treated with carbon dioxide at 37°, and observations on men after the introduction of large amounts of zinc oxide *per os* convinced the author that the power of the intestine to absorb zinc oxide is extremely low, and that the portal of entry is the lungs, from which the zinc is absorbed into the blood.

Other conclusions which the author draws are as follows: The zinc dust in the lungs changes to zinc bicarbonate which, in dissolved form, is taken up by the blood and through its direct effect on the heat regulating centers causes a hyperthermia. The zinc is excreted from the organism chiefly through the kidneys. The intestine excretes only insignificant amounts. Animals of the same species and of different species showed a varying susceptibility to zinc. From the standpoint of the ion theory, brassfounders' ague may be explained as a disturbance of the normal ratio of the dibasic cations to the monobasic, namely, by a relative preponderance of the latter which possess the function of elevating the body temperature.

The author recommends, in addition to prophylactic hygienic measures and diuretic therapy, the use of calcium preparations.—M. C. S.

CHRONIC LEAD POISONING AND ITS TREATMENT WITH SULPHUR BATHS IN PJATIGORSK. *S. Winogradskaja. Gigiena Truda, 1925, no. 7, pp. 55–62.*

Twenty-eight persons, all printers, suffering from chronic lead poisoning were given the sulphur bath treatment at the sanatorium in Pjatigorsk for a period of six weeks. As a result fourteen were completely cured, nine considerably improved, four improved, and one unchanged.—M. C. S.

LEAD INTOXICATION IN COLOR GRINDERS. *B. Kogan and L. Smirnow. Gigiena Truda, 1925, no. 7, pp. 85–91.*

The specific effect of lead on the organism of the workers in a Moscow factory for the grinding of lead colors was studied. Of thirty-two workers who came into direct contact with lead colors only two were free from symptoms of lead poisoning. The average length of service was ten months, and only eight had worked as long as two years. In twenty-one cases a

lead line was present and in an equal number basophilic granulations were found. In nine cases a lymphocytosis was observed (over 35 per cent. lymphocytes), in six a monocytosis (large mononuclears over 8 per cent.), and in three eosinophils over 4 per cent. Basophilic granulation was the only symptom found in the same frequency as in Lehmann's work. This emphasizes its value in early diagnosis.

The author recommends that all employees undergo thorough clinical examination and that at least once a month during the first three months of employment new workers be reexamined in order that timely measures can be instituted.—M. C. S.

Distribution of Lead in Body in Lead Poisoning. *F. Schütz and H. Bernhardt. Abstr. as follows from Ztschr. f. Hyg., 1925, vol. 104, pp. 441–463, in Physiol. Abstr., Sept.-Oct., 1925, vol. 10, p. 373.*

A new quantitative electrical method for the estimation of very small quantities of lead in animal tissues is described. The highest concentrations of lead are found in the spleen, gallbladder, and brain, whereas little appears in the lungs and liver. The appearance of basophil granulations in the erythrocytes is the only definite and universal symptom of lead poisoning.—B. L. G.

Experiments on the Rate of Settling of Blood Corpuscles in Chronic Lead Poisoning. *Schnitter and F. Paris. München. med. Wchnschr., Oct. 30, 1925, vol. 72, p. 1876.*

An investigation of the rate of settling of blood corpuscles of twenty-eight workers in the lead industry showed variation of from 80 minutes to 1,260 minutes in time of settling. These workers had been exposed for as little as one week in one case to three years in others. There was an apparent difference in rate of settling between "sound" and poisoned lead carriers. It has not yet been shown whether or not this retardation of settling involves a direct toxic action on the liver.—L. T. F.

Vascular System in Lead Poisoning. *A. Tscherkess. Arch. f. exper. Path. u. Pharmakol., 1925, vol. 108, pp. 220–229.*

Lead Poisoning and Vascular System. *A. Tscherkess and E. Philippowa. Ibid., pp. 365–376.*

Abstracted as follows in Physiol. Abstr., Dec., 1925, vol. 10, p. 485; Jan., 1926, vol. 10, p. 544.

Lead nitrate and lead acetate, when added to Ringer's solution, constrict the perfused vessels of isolated organs of the rabbit, such as the ear, spleen, kidney. The dilutions used varied from 1 in 1,000 to 1 in 10,000,000.

In experimental lead poisoning the vascular reactions of the isolated ear, spleen, or kidney change. Vasodilators, such as caffeine or chloral, produce paradoxical effects and constrict the vessels.—B. L. G.

Royal Commission on Plumbism in Port Pirie, South Australia, 1925. *K. R. Moore. Health, Commonwealth of Australia, Nov., 1925, vol. 3, pp. 177–181.*

The author of this short sketch was chairman of the Royal Commission appointed to investigate the occurrence of lead poisoning at Port Pirie

where silver-lead ores mined at Broken Hill are smelted. The prevalence of lead poisoning among the miners at Broken Hill was the subject of a previous investigation which led to the passing of the Workmen's Compensation (Broken Hill Lead Poisoning) Act, 1922. The present Commission reports that plumbism was occurring among the smelters owing to the absorption of lead bearing dust or fumes mainly through the respiratory tract—the absorption rate being more rapid than the elimination rate; it considers that plumbism at Port Pirie presents a complex in which carbon monoxide poisoning and lead poisoning run concurrently. Compensable cases numbered 56 in 1922, 89 in 1923, and 234 in 1924; while from 1910 to 1916 there were no cases. This rapid increase, however, is somewhat deceptive, since information was obtained that 219 cases were treated between 1911 and 1917 at the local hospital. The increase in cases is attributed to an increase in the amount of lead bearing material being smelted in a comparatively limited area, to a change of character in the materials treated which are more liable to create fine dust, and to a change in the composition of the working force. Three essential principles are laid down as needed to insure protection: first, the prevention of the escape of fumes; second, a reduction of dust to a minimum; and third, education of the workers as to risk.

The Commission recommends hygienic supervision of the operations of smelting, and medical certification and compensation for industrial disease, including both lead poisoning and carbon monoxide; for this purpose it considers that the Compensation Act operating at Broken Hill should be applied to Port Pirie. It also recommends that only six shifts per week instead of seven should be worked. An omission in its recommendations is the establishment of periodic medical examination for all those employed.—E. L. C.

THE ACTION OF PARAPHENYLENDIAMIN. AN EXPERIMENTAL STUDY. *K. W. Dewey. Arch. Int. Med., Nov., 1925, vol. 36, pp. 724–734.*

A partial summary of the author's findings is as follows:

There is a marked difference in the susceptibility to para-phenylenediamine not only in species of animals but also in individuals of the same species.

In people with an idiosyncrasy for the drugs para-phenylenediamine (in an industrial occupation or after the use of the hair dye) produces local and general symptoms that resemble somewhat those observed in the dog. The drug apparently is absorbed by the skin to some extent.

Dogs are the most susceptible to the drug. A fatal dose is 0.1 gm. per kilogram of body weight with death occurring from two to three hours after injection. Marked symptoms are produced by 0.05 gm. Cats react similarly.

Guinea-pigs, like rabbits, are not affected by a subcutaneous dose that is fatal to the dog. Frogs are very susceptible to the poison applied externally; it is rapidly absorbed by the skin.

The symptoms in dogs, cats, and rabbits are a localized edema. In guinea-pigs, mice, and frogs they are nervous manifestations: paresis, paralysis, or convulsions.

The action of the drug is perhaps in all cases on the nervous system. The edema about the head may be the result of vaso-disturbances. The localization may correspond to differences in the constitution of the vessel walls in the involved areas.

—M. C. S.

DUST HAZARDS AND THEIR EFFECTS

A Review of our Present Knowledge of Pneumoconiosis, Based upon Roentgenologic Studies, with Notes on the Pathology of the Condition. *H. K. Pancoast and E. P. Pendergrass. Am. Jour. Roentgenol., Nov., 1925, vol. 14, pp. 381–423.*

Mention is made of the chief studies conducted in this country on the subject of pneumonokoniosis, which are not to be compared in extent with those made in South Africa, Australia, and Great Britain. The authors prefer the term "pneumoconiosis" as the general descriptive term, and silicosis and possibly the others such as anthracosis to designate the condition arising from special industries. Anthracosis, siderosis, and chalicosis imply occupation only, as the active agent in all of them is silica. In coal mining the condition (anthracosis) is somewhat different, in that silica is the active fibrosing agent and the coal dust is relatively harmless or produces quite different effects. In South Africa the term "miners' phthisis" legally implies silicosis.

The authors divide dusts from the standpoint of their dangerous properties into three general groups: (1) those which are dangerous because of their poisonous action, as lead, arsenic, mercury, etc.; (2) those which cause only irritation in the respiratory tract, resulting in such conditions as chronic bronchitis or asthma; and (3) those which tend to produce pulmonary fibrosis, and may thereby predispose to respiratory infections, especially tuberculosis and pneumonia. It is with the last group only, and with silica especially (SiO_2), that this study is mainly concerned, as the authors state: "Probably several other dusts besides free silica produce fibrosis, but no others do so to anything like the extent that silica does." And they believe that only by continued roentgen ray investigations can any definite conclusions as to the relative effects of inorganic dusts other than silica be reached.

The important factors in the production of lung fibrosis are given as: (1) the time at work or exposure to the dust; (2) the quantity of dust present; (3) the quality of dust with special reference to silica; and (4) the size of the particles. It was formerly believed that sharp points and edges were the dangerous factors in a dust but it is now known that this is not the case. The naked eye appearance of a dusty atmosphere is no criterion as to the damage producing properties of the dust. The very small particles of silica are the most dangerous, and respirators are therefore of little use as a preventive measure. Hard rock mining is a dangerous occupation as large percentages of free silica are encountered, especially in gold, copper, zinc, lead, silver, nickel, and cobalt mines. In hard rock mining the most dangerous occupation is usually that of the driller. Anthracite coal mining is more likely to produce pneumonokoniosis than bituminous mining. Granite cutting is also a dangerously dusty occupation because of the high percentage of free silica in the dust, and there is more or less hazard in other occupations, "such as potters, sand paper makers, tool grinders, metal polishers and grinders,

brick makers, especially firebrick, and occupations in which sand blasts are used." Workers in pure limestone or marble, on the other hand, "may acquire pneumoconiosis, but it never reaches the advanced state found in the workers in silica rocks."

"It has been the experience of those who have investigated the causes of silicosis, and especially in South Africa, Australia and England, that much of the serious damage to the lungs can be prevented." Some of the measures for protection of the workers in those countries are briefly cited. Precautionary measures are considered to be of two general types, those directed against the production of pneumonokoniosis and those directed toward the prevention of tuberculosis in the workers who have developed advanced silicosis. Dry drilling is the first danger and probably the most important one; in South Africa it is prohibited by law. Blasting is dangerously dusty and should come at the ends of shifts. Water is regarded as the most reliable precautionary agent, although it may not be practicable in all mining industries. In dusty factories, such as asbestos and cement works and potteries, cleanliness and ventilation are essential. The prevention of tuberculosis in workers who have developed advanced silicosis has been undertaken by the Technical Commission of Broken Hill since 1921 by excluding all tuberculous and silicotic workers from mines, in both surface and underground workings, by providing employment elsewhere for the silicotics, and by compensating the tuberculous and disabled silicotics; periodic examinations of the workers were insisted upon. This practice has been followed also by the Miners' Phthisis Prevention Committee of South Africa.

A large part of the article is devoted to the pathology of the "dust cell" and to the roentgenologic stages of progress of the fibrosis in pneumonokoniosis. Eighteen roentgenograms are reproduced showing these stages in workers in different industries. Statistics are also given from the authors' own experience in the study of several hundred cases of pneumonokoniosis in coal miners, hard rock miners, granite cutters, potters, metal grinders and one worker in bronze work (the material being in liquid form), brick workers, cement workers, and asbestos workers. Statistics from the experience of other studies are cited from the literature for all these industries, and also for carborundum and limestone workers, among whom the authors had no experience. The findings of the authors for pneumonokoniosis are given for workers in miscellaneous inorganic dusts and for workers in organic dusts, *e.g.*, wood workers, textile workers, and tobacco workers, with citations from other recent studies.

The authors in conclusion urge "the more wide-spread study of dusty industries by roentgenologic investigations with a view of lessening the dangers to which many workers are exposed." In the list of sixty-eight references given at the end of the article the work of foreign and American investigators is cited.—B. L. G.

THE ORIGIN OF THE DUST CELL. *H. M. Carlton. Bull. d'histol., Dec., 1925.*

Dust which gains access to the alveoli of the lungs is there absorbed

by certain cells—"dust cells." Much work has been done to determine the origin of these cells. This work is reviewed in this article, which contains useful references to papers by Haythorn, Permar, Mavrogordato, Metchnikoff, Aschoff, Kiyono, Guieysse-Pellissier, and others. The problem to answer is whether the dust cell is derived from the endothelium of the capillaries, or from the endothelium of the alveoli. The evidence collected, together with the observations of the author, leads him to conclude that at least the majority of dust cells are derived from the small epithelial cells of the lung, rather than from the capillary endothelium. —E. L. C.

Stone Dust as a Preventive of Coal Dust Explosions. *G. S. Rice and R. V. Wheeler. Safety in Mines Res. Board Paper No. 13. H. M. Stationery Office, 1925. Abstr. as follows in Circular of British Mines Department.*

This paper is an outcome of the arrangement for co-operative research made between the Safety in Mines Research Board and the United States Bureau of Mines, details of which have been given in the Annual Report of the Safety in Mines Research Board for 1924 (see This Jour., 1925, vol. 7, Abstr. Section, p. 186).

Until quite recently the Bureau of Mines of the United States of America and the Safety in Mines Research Board (which has continued, *inter alia*, the investigations of the Explosions in Mines Committee of the Home Office) have worked independently and have arrived at apparently different conclusions regarding the amount of stone dust which must be mixed with coal dust in order that the mixture shall be incapable of propagating flame when raised as a cloud in the air. In order to obtain a direct comparison of the results of the experiments carried out at the Experimental Mine at Bruceton, Pa., and at the Experimental Station at Eskmeals, Cumberland, tests have now been made with a standard British coal (Altofts Silkstone) and a standard American coal (Pittsburgh) at the American testing station, and again, with the same coals, at the British testing station, under the conditions prevailing at each station, respectively.

To the British mining engineer, the most important conclusion drawn from these two series of comparative tests (which are described in the present paper) is that the behavior of the American and British coals, selected as standards, is sufficiently uniform under similar conditions of testing to render available for direct application to British coals the results of the numerous series of experiments made with the Pittsburgh coal at the Experimental Mine in America in order to gage the effect of such factors as the degree of fineness of the dust and the direction of the ventilating currents.

Coal Dust Explosions. The Effect of Release of Pressure on their Development. *H. P. Greenwald and R. V. Wheeler. Safety in Mines Res. Board Paper No. 14. H. M. Stationery Office, 1925. Abstr. as follows in Circular of British Mines Department.*

This paper is the second joint publi-

cation by the United States Bureau of Mines and the Safety in Mines Research Board, and describes work carried out at Eskmeals during the summer of 1924, when Dr. Wheeler, the Director of the Experimental Station, had the assistance of Mr. H. P. Greenwald, Assistant Physicist on the Bureau of Mines staff.

The results obtained have a direct application to actual coal mining conditions, for they show clearly that there is less danger of a coal dust explosion developing from a given source of ignition at a long-wall face than at a "dead-end" or *cul-de-sac;* and, generally, that branch roads near the point of ignition of an incipient coal dust explosion, by affording release of pressure, retard and may prevent the development of the explosion. Again, the course of a partially developed explosion may depend on the arrangement of the mine roadways and branching passages, a knowledge of which will indicate the positions in the mine at which the most stringent measures should be taken against the accumulation of coal dust or the occurrence of a source of ignition.

OCCUPATIONAL AFFECTIONS OF THE SKIN AND SPECIAL SENSES

Radiodermic Ulcer. *W. Dubreuilh and David-Chausse. Abstr. as follows from Ann. de dermat. et syph., 1925, vol. 6, pp. 161–169, in Am. Jour. Roentgenol., Sept., 1925, vol. 14, p. 279.*

There are two types of radiodermatitis, acute and chronic. The chronic type is caused by an accumulation of small doses of the roentgen ray over a period of years, the symptoms being pigmentation, hyperkeratosis, epitheliomas, and probably neuritic ulcers. The acute type is caused by excessive irradiation with strong doses of the roentgen ray. After apparent cure the ulcer may return either spontaneously or from traumatism. Two cases are reported.—B. L. G.

Boiler-Makers' Deafness. *W. Katin-Jarzew. Gigiena Truda, 1925, no. 7, pp. 42–48.*

After a brief consideration of the processes of boiler making, the author takes up the etiology of boiler-makers' deafness. The generally recognized etiologic cause is the noise. Opinions differ with regard to the influence of vibration. On the basis of his experience the author is inclined to attribute to vibration no less etiologic significance than to noise.

The chief clinical symptoms given are as follows:

1. A greater or lesser lowering of the hearing power, together with a distinct difference in the ability to hear the whispering voice and the usual voice.
2. Shortening of air and bone conduction of tuning fork tones.
3. Subjective symptoms such as noises in the ears, dizziness, frequently accompanied by objective disturbance of the equilibrium.

The relationship between diseases of the middle and of the inner ear, as well as the effect of noise on the vestibular apparatus, require further investigation. It is the author's opinion that the vestibular apparatus is affected sympathetically.—M. C. S.

GLASS BLOWERS' CATARACT. *A. A. Kolena. Gigiena Truda, 1925, no. 7, pp. 49–54.*

The author gives a review of the literature on the relation between the effect of light and the formation of cataracts. He carried out experiments on eighty-four workers engaged in glass blowing in a large factory which produces electric light bulbs exclusively. The blowing was done by mouth. Near the furnace opening the temperature was 60°C.; at the end of the work table it was 20°. The workers wore no goggles. The furnaces were always open and they had no protecting devices. Most of the workers had been employed the greater part of their lives in blowing chemical vessels.

Cataracts were found in ten of the eighty-four workers, or 11.9 per cent. This percentage is lower than those of other investigators.

The author's findings did not confirm those of Wick as to the beneficial effect of rest pauses. On the other hand, his results agree with those of Hirsch that the occupation of glass blower does not have an unfavorable influence on the faculty of vision.

In conclusion several protective measures are recommended.—M. C. S.

INDUSTRY PREVENTS AND REMEDIES WORKERS' EYE DEFECTS. *J. W. Smith. Nation's Health, Nov., 1925, vol. 7, pp. 729–731.*

Not more than 50 per cent. of the workers in industrial fields possess normal vision. In 1920 the author examined the eyes of employees of the Electrical Testing Laboratories in New York, where the character of the work is considered productive of eyestrain, and has checked the condition of these workers' eyes every year thereafter. The alarming percentage of workers found in 1920 to have subnormal eyesight led to regular examinations before employment, treatment when necessary, correction with glasses, and care in assignment to tasks, with the result that the percentage of those working with subnormal vision was reduced from 59 in 1920 to 6 in 1925.—E. S. C.

OCCURRENCE AND PREVENTION OF INDUSTRIAL ACCIDENTS

THE AFTER CARE OF INDUSTRIAL ACCIDENTS. *Calif. and Western Med., Sept., 1925, vol. 23, pp. 1177–1178.*

In proper after care lies the real secret of success in treating industrial accidents. The attending physician should consider that this is his particular work and is not to be left to the nurse or to the patient. It is during this time that serious complications are liable to occur. Physiotherapy is very useful and should be part of the industrial surgeon's equipment.—B. L. G.

ELECTRICAL EXPLODERS FOR SHOT-FIRING IN COAL MINES. *Safety in Mines Res. Board Paper No. 11. H. M. Stationery Office, 1925. Abstr. as follows in Circular of British Mines Department.*

This is a report by the Explosive in Mines Research Committee. The use in coal mines of permitted explosives,

which are of the type of high explosives, requires the employment of a detonator which according to present practice is fired by a magneto exploder. For safety and efficiency the magneto exploder must be incapable of igniting firedamp but must be fully capable of igniting the detonator. The problems discussed in the present report are those of devising safe and reliable exploders which will fulfil these conditions, or alternative means of providing the current necessary to actuate detonators.

The investigation has shown that existing electric exploders, when properly made, are well suited for igniting both high-tension and low-tension fuseheads both singly and in series of two. It has also shown that they can readily be made safe in the presence of firedamp by several methods. The two which appear to be the best have been examined in detail; of these the Committee prefers that which provides a suitable short circuit path (such as a broad band of copper of suitable thickness) next to the armature core.

With regard to the alternative problem, namely, of suggesting means other than magneto exploders of providing the current necessary to actuate detonators, an account is given for the first time of work carried out at the Home Office Experimental Station, Eskmeals, during 1913 to 1914. It is concluded that dry batteries, provided they are maintained in good condition, are satisfactory for low-tension fusehead ignition. Regarding high-tension fuseheads, a new form of shot firing apparatus consisting of a single winding and a single dry battery has been developed and found to be safe and satisfactory.

THE SUPPORT OF UNDERGROUND WORKINGS IN THE COALFIELDS OF SCOTLAND. *Safety in Mines Res. Board Paper No. 12. H. M. Stationery Office, 1925. Abstr. as follows in Circular of British Mines Department.*

This paper is the second report of the Committee appointed to investigate methods of reducing the number of accidents due to falls of ground in coal mines, the cause of half the total number of fatal accidents. The Committee is making a study of timbering practice in certain coal fields and dealt with those of South Wales in an earlier report (Safety in Mines Research Board Paper No. 6). In the present report the Committee gives an account of the best practice for supporting the workings in the Scottish mines and makes suggestion for improvements where existing practice is open to criticism. Many of the suggestions made apply equally to other coal fields. The report is brief and should be carefully studied by all concerned with mine timbering, especially in Scotland.

THE LIMITS OF INFLAMMABILITY OF FIREDAMP AND AIR. *M. J. Burgess and R. V. Wheeler. Safety in Mines Res. Board Paper No. 15. H. M. Stationery Office, 1925. Abstr. as follows in Circular of British Mines Department.*

This paper should be read in conjunction with Safety in Mines Research Board Paper No. 8, "The Ignition of Firedamp" by H. F. Coward and R. V. Wheeler (see THIS JOUR., 1925, vol. 7, Abstr. Section, p. 214); for there are two conditions essential to the production of an explosion of firedamp and air in coal mines: an explosive mixture and an

adequate source of ignition. The second condition was dealt with in Paper No. 8 and the first condition forms the subject of the present paper. Among the chief deductions to be drawn from the experimental work recorded are:

A marked effect on the limits is produced by the direction that the flame can take, an effect which can be explained as being that of convection currents. The widest range of inflammability occurs during upward propagation of flame and the narrowest during downward propagation, while for horizontal propagation the values are intermediate. For horizontal propagation of flame there does not appear to be much difference in the limits whether the mixture is totally confined or is free to expand. For upward propagation, however, the lower limit is least when the mixture is free to expand and the upper limit is greatest when the mixture is totally enclosed.

Such variations in temperature and pressure as ordinarily occur in coal mines do not appreciably affect the limits of inflammability of firedamp.

A mixture of firedamp and air containing about 5 per cent. of firedamp can propagate flame (*a*) under certain limiting conditions of turbulence of the mixture, or (*b*) when the mixture is traveling as a slow current.

The presence of water vapor in the atmosphere does not appreciably affect the lower limit of inflammability. The reduction of the oxygen content of the air narrows the limits. If the reduction of the oxygen content is brought about by the addition of carbon dioxide, the limits are narrowed more rapidly, owing to the fact that the specific heat of carbon dioxide is higher than that of nitrogen.

The effect of the presence of another combustible gas is dependent on the nature of that gas and can be calculated from the known values for its limits of inflammability with air alone.

A New Method of Measuring Pressures. *G. Allsop. Safety in Mines Res. Board Paper No. 16. H. M. Stationery Office, 1925. Abstr. as follows in Circular of British Mines Department.*

This paper describes a gage designed specifically for measuring momentary pressures, the application in the present instance being to the measurement of the pressure produced when an electric arc is struck. The description of the gage is published in the belief that it may prove useful to other workers on similar problems.

INDUSTRIAL SURGERY

The Railway Surgeon and the Injured Employe. *B. H. Minchew. South. Med. Jour., Oct., 1925, vol. 18, pp. 761–764.*

The railway surgeon has many classes of employees to deal with; he must not only be able to diagnose correctly the patient's physical injury, but also be able to recognize his mental attitude, as this diplomacy on the part of the company physician may be the deciding factor in making of the patient a malingerer or a loyal employee in the future. A complete history of the injured employee is of the greatest importance, particularly in regard to

past injuries; the examination should be as thorough as the history. The railway surgeon should get in touch with the family and with the family physician; his report to the employer should be full and frank and prompt, and legal blanks should be filled in with care and caution. All cases involving loss of time should be hospitalized, as much to protect the mental attitude of the patient as for treatment.—B. L. G.

INDUSTRIAL PHYSIOLOGY: NUTRITION, METABOLISM, FATIGUE, ETC.

RESUSCITATION WITH ALPHA LOBELIN. A NEW SPECIFIC STIMULANT OF THE RESPIRATORY CENTRE. *O. Hofmeister and H. S. Reichle. Med. Jour. and Rec., Oct. 21, 1925, vol. 122, pp. 480–482.*

The authors believe that lobelin "is a powerful stimulant of respiration, which to date has proven to be of great value in all cases of functional central respiratory depression." Seven cases are cited. The statement is made that "this drug can be used to the greatest advantage in suitable cases in connection with Henderson's carbon dioxide, oxygen method."—B. L. G.

NUTRITION EXPERIMENTS WITH A VEGETABLE DIET DURING MENTAL AND PHYSICAL WORK. *H. Ilzhöfer. Arch. f. Hyg., 1925, vol. 96, pp. 102–121.*

Metabolism experiments were made with a subject on a vegetable diet and under different conditions of work. The diet consisted largely of fruit, dates, figs, nuts, chocolate, etc., supplemented with tea, coffee, cocoa, wine, and beer. Nitrogen balance and respiration experiments were made throughout the periods and comparison was made of the caloric intake and output under varying diets and conditions of work. This metabolism study clearly indicates a normal caloric utilization under such a dietary régime.—L. T. F.

WAGES AND HOURS OF LABOR IN METALLIFEROUS MINES: 1924. *U. S. Bur. Labor Statistics, Bull. No. 394, Aug., 1925, pp. 34.*

WORKING CONDITIONS IN PLANTS WHERE SUGAR IS PULVERIZED BY HAND. *A. Schafranow. Gigiena Truda, 1925, no. 7, pp. 102–109.*

The work is carried on in three eight-hour shifts; there are no holidays; pay is on the piece basis. Observations were made on workers in all three shifts during two seasons (1924 and 1925), each time over a seven-day period. About seventy to eighty girls and women from 18 to 35 years of age worked on a shift.

The author found that the workers who have acquired the most systematic motions and the correct rhythm accomplish the most work with the least strain; complete their task in the shortest time; suffer least physically; and show no disorganization of motions, at least while working at the usual speed.

Dynamometer results and pulse rates showed that night work disturbs the organism more than day work.

If the women did not have to carry the large lumps themselves, they

would save at least one-third of the working time; and would be relieved of the necessity of carrying heavy loads for which women's strength is insufficient. The time saved in this way might well be used for rest pauses, for uninterrupted work at chopping would exhaust the workers more quickly than even the present arrangement.—M. C. S.

WOMEN AND CHILDREN IN INDUSTRY

Occupational Diseases in Women. *B. Friedlaender. Am. Jour. Obst. and Gynecol., Sept., 1925, vol. 10, pp. 403–408.*

The results of an investigation of findings in the Woman's Hospital and Infant's Home, Detroit, Mich., are here given. A comparison of birth rate among 1,000 domestic workers with that among the same number of industrial or factory workers showed that 14 per cent. of the domestic workers had six children, the same percentage five children, and 20 per cent. had one child and two children; among the industrial workers none had six children, only 4 per cent. had five, 19 per cent. had two, and 32 per cent. only one child.

Aside from the factors causing sexual disorders, due largely to economic conditions, there are other definite factors causing occupational diseases in women, such as crowded, dust and germ laden, poorly ventilated rooms; long hours of work, cramped position, monotonous mechanical repetitions; chemical and toxic effects; and factory accidents. From an examination of 117 cases at the Woman's Hospital Gynecological Clinic it was proved that the increase in contracted pelvis is in proportion as the bearing women belong to the heavy working classes and live in poor economic conditions. Among the occupational diseases affecting the genital organs and their functions, chlorosis, anemia, and tuberculosis play an important part; although other factors enter in, such as heredity and environment, experience has proved that certain industries predispose toward these diseases. Lead, for example, acts as an abortifacient; carbon disulphide found in vulcanizing work, nicotine, and the X-ray also act on the germ cells. Continued standing or sitting in one position is very injurious, as is also continued motion of the foot necessary in feeding foot power machines or operating sewing machines. As a result of deformities thus caused in young girls come future dystocias and malpositions. Among 1,000 deliveries the proportion of stillbirths and abortions was 150 to 170, according to severity of work, among industrial workers, as against 30 among domestic workers; the proportion for forceps deliveries among industrial workers was 28 as against 15 among domestic workers; for cesarean section among industrial workers 0.2 as against 0.04 among domestic workers.—B. L. G.

The Work Hazards of Women Street Car Conductors during Menstruation. *Emdin. Gigiena Truda, 1925, no. 7, pp. 101–102.*

The working conditions of street car conductors in Kasan were investigated

for the purpose of determining whether a monthly leave of absence should be granted women conductors during menstruation. The three factors which it was considered might have an unfavorable effect on the health of the women are: the constant jarring; the necessity of jumping off the car ten to fifteen times a day to put on the trolley; and working in the open during the winter—there are no heated rooms in the terminals. The question was left unsettled, however, because it was feared that granting monthly leave would lead to the replacement of the women by men.—M. C. S.

THE EMPLOYMENT OF YOUNG PERSONS IN THE UNITED STATES. *Nat. Indust. Conference Board, 1925, pp. 150.*

This report is a valuable source of reference on the factors, extent, and character of employment of young persons; on the effects and regulation of their employment; and on the problem of federal regulation. Data for the separate states are given in the appendix.—M. C. S.

REFERENCES ON CHILD LABOR AND MINORS IN INDUSTRY: 1916–1924. *U. S. Dept. Labor, Children's Bur. Pub. No. 147, 1925, pp. 153.*

VOCATIONAL GUIDANCE AND JUNIOR PLACEMENT. *U. S. Dept. Labor, Children's Bur. Pub. No. 149, Employment Ser. Pub. A, 1925, pp. 440.*

INDUSTRIAL SANITATION: FACTORY CONSTRUCTION, ILLUMINATION, VENTILATION, HEATING, WATER SUPPLY, SEWAGE DISPOSAL

SURVEY OF HYGIENIC CONDITIONS IN THE PRINTING TRADES. *S. Kjaer. U. S. Bur. Labor Statistics, Bull. No. 392, Sept., 1925, pp. 229.*

This survey covers the conditions in approximately 1,000 representative printing trade plants and detailed inspections of 536 establishments located in twenty-one cities of the United States. The number of workers in the plants surveyed was 81,314, about 20 per cent. of the total number of workers in the trade in this country. Slightly over one-fifth of the workers were females and about one-sixtieth were over 60 years of age.

The various operations in these plants are described in great detail with regard to the processes involved in each. The operations are considered under the following departments: composition, type founding, plate making, presswork, and binding and bookbinding. They are well illustrated with particular reference to ideal conditions. About half of the subject matter is devoted to the conditions found with regard to housing, lighting, ventilation, sanitation, hazards, and accidents in printing trades, and to general recommendations for their improvement. The description of operations makes excellent reference material for anyone desiring detailed knowledge of the methods in general use in any single process.

Special attention is directed to the need for proper factory buildings with

reference to environment, working space, and lighting. The importance of proper ventilation is stressed. The individual motor drive system found in many of the larger up-to-date places is recommended as a very effective method of bringing about ideal plant conditions. The various hazards, chiefly dust and fumes, are discussed in connection with ventilation problems. In general, particularly in the larger establishments, adequate lighting, ventilation, and working space was found. The smaller plants showed the most need for improvement.

Toilet and washing facilities were often found to be sufficient but little used owing to carelessness on the part of employer and employee. Little understanding of their importance was shown in many of the shops. Health supervision in some form was practised by most of the factories and some conducted special examinations of those workers subjected to hazards, particularly lead fumes and dust.

The chief occupational diseases found were tuberculosis and lead poisoning; the occurrence of these is discussed in detail with special reference to the best methods of prevention. Attention is called to the danger of carbon monoxide poisoning from the illuminating gas heaters so extensively used in many of the processes. The hazards incident to working with chromates, bronze dust, potassium cyanide, and other chemicals were found to be much underrated by both workers and employers. In many instances, however, increasing effort was being made to protect employees against the physical fatigue and mental strain caused by some of the skilled operations.

The accident rate was found to be about 1 to each 585 employees and chargeable principally to processes in the pressroom.

In general, the survey showed the further need of intensive educational work among both employers and workers. Some establishments were found to be splendidly equipped but many more showed the need of further effort to better conditions. The report of the survey covers a large amount of material and gives a comprehensive picture of conditions in the printing trades. The quantity of detail it contains, however, makes it more valuable as a reference book than as a handbook of definite recommendations and suggestions.—D. C. P.

STUDIES IN ILLUMINATION: I. THE HYGIENIC CONDITIONS OF ILLUMINATION IN CERTAIN POST OFFICES, ESPECIALLY RELATING TO VISUAL DEFECTS AND EFFICIENCY. *L. R. Thompson, L. Schwartz, J. E. Ives, and N. P. Bryan. U. S. Pub. Health Bull. No. 140, 1924, pp. 118.*

The report is too long and detailed for abstracting. The authors' conclusions and recommendations afford an excellent summary of the essential features of the report and are quoted herewith in full:

Conclusions

The illumination in the post offices studied was found to be low in intensity and unsatisfactory in its distribution, both because of the nature and the spacing of the lighting units used, and because of the lack of their proper maintenance, reflectors frequently being dirty or missing, and bulbs, dirty, old, or missing. Glare is frequently present, shadows are numerous, lights are improperly spaced and improperly located in relation to work, and the

intensity of illumination is irregular and unequal. The actual mean illumination in these post offices is generally below that of the requirements of the State codes of lighting and is generally lower than the mean illumination furnished employees doing similar work in private industries.

The number of eye defects and the number of cases of defective vision vary, in a general way, as the work processes require increased intensity of eye work, the largest number of defects and the poorest vision being found in the group of workers doing the most intensive eye work.

There seems to be a definite relation between certain diseases of the eye and defects of vision and the amount of illumination under which the workers are occupied. In this respect it was found that the employees at the old post office, the majority of whom were working under an average artificial illumination of 2 to 3 foot-candles, had a smaller percentage of normal vision and a greater percentage of certain eye defects than the employees at the new post office, the great majority of whom were working under all or part-time daylight.

The higher the intensity of illumination, up to a certain point, the greater was the rapidity with which the work was performed. The data collected seem to indicate that less fatigue is experienced under higher illumination, especially in the poorer vision groups.

It is believed that installation of higher illumination would result in a pecuniary saving to the post office, would tend to reduce eye fatigue and the eye defects resulting therefrom, and would conserve the eyesight of the employees.

Recommendations

The present illumination in the post offices should be changed. There should be installed in the general workrooms and offices systems of totally inclosing units, of the diffusing or light-directing type, giving a general intensity, when first installed, of 10 foot-candles[1] everywhere on a horizontal working plane 45 inches above the floor, and all local lighting should be done away with.

The lighting unit to be installed in the general workrooms of the post office should be of such quality of glass and of such shape and size that its brightness at any point of its surface would not exceed 2.5 candles per square inch when used with an incandescent lamp or other source of light emitting 3,100 lumens. This unit should have an output of at least 80 per cent of that of the clear lamp and a spherical distribution of its candlepower such that at least 8 per cent of the light emitted by the clear lamp would be emitted by the unit through the zone from 0° to 30°, at least 28 per cent from 0° to 60°, at least 48 per cent from 0° to 90°, and at least 25 per cent from 90° to 180°.

The lighting unit for the offices of the post office should be of such quality of glass and of such shape and size that its brightness at any point of its surface would not exceed 2 candles per square inch when used with an incandescent lamp or other source of light emitting 3,100 lumens. This unit would have an output of at least 80 per cent of that of the clear lamp and a spherical distribution of its candlepower such that at least 5 per cent of the light emitted by the clear lamp would be emitted by the unit through the zone from 0° to 30°, at least 20 per cent from 0° to 60°, at least 40 per cent from 0° to 90°, and least 35 per cent from 90° to 180°.

The units for both the general workrooms and the offices should be such in number and so spaced that their brightness measured in lumens per square foot would not be more than one hundred times as great as the intensity of the illumination, measured in foot-candles, produced by them on a horizontal plane 45 inches above the floor.

Wire screening should not be used for the back of a separation case, on account of its bad effect upon the eyes. It should be replaced by a continuous surface, or by strips of wood 2 inches wide and one-fourth of an inch apart, so as to allow ventilation.

Employees in the post office should do their work at such places and in such

[1] Ten foot-candles, when first installed, are recommended so as to allow for a deterioration of 20 per cent, which would reduce the illumination to 8 foot-candles.

shifts that they would have daylight illumination for as great portion of their working time as possible. Separation work should not be done in the basement of any post office building, except to meet an emergency. New post offices should be so constructed that as much work as possible may be done under daylight.

The eyes of post-office employees should be examined once a year; any defects found should be recorded, and the employee with a defect should be advised to have it corrected. The examination should be made by a physician who has made the eye a specialty.

In post-office work requiring fine eye discrimination or long-continued use of the eyes, such as the work of the directory division, the work of the letter separators, the work of the auditing section of the money-order division, and other work of similar nature, only such persons should be employed as have normal vision, at least in one eye, with or without corrective lenses.

In order to obtain the recommended intensity of illumination of 10 foot-candles (when the lighting is first installed) on the working plane, it will probably be necessary to use about 2 watts per square foot of floor area in the general workrooms of the post office.

The best spacing and mounting height of the units and the best size of lamps to use will depend on the height of the ceiling and the height of the working plane.

The relation of the separation cases, tables, and desks to the lights should be such that no shadows would fall upon the working plane. In case it is necessary to move the lighting fixtures in order to accomplish this result, detachable or removable fixtures may be used.

In the illumination of separation cases the relation of the separation cases to the lights should be such that the centers of the units would be 1 foot in front of the plane of the vertical faces of the pigeonholes.

The care of the lighting should be placed in the hands of one man, who should be responsible for the upkeep and good condition of the units. He should make a daily round of the building and replace all burnt-out lamps and broken fixtures. He should cause the lighting units to be cleaned once a week or as often as is necessary. He should see that the walls and ceilings are kept in satisfactory condition, so that they will serve as good reflecting surfaces for the light. He should make measurements once a month with a foot-candle meter, in order to see that the uniformity and constancy of the illumination are maintained.

The switches should be under the control of the foreman, and should be so arranged that the number of lights turned on and the order in which they are turned on would be such as to give the necessary illumination, while at the same time economizing the light.

This report includes a well-prepared bibliography and index, and contains numerous charts, tables, and illustrations relevant to the subject matter. Considered both from the editorial standpoint and from the standpoint of the hygienist, it is unusually well prepared.—P. D.

INDUSTRIAL MEDICAL SERVICE: MEDICAL DISPENSARIES AND HOSPITALS IN INDUSTRIAL PLANTS

Occupational Hazards—Fatigue, Work and Rest. *L. I. Harris. Med. Jour. and Rec., Nov. 18, 1925, vol. 122, pp. 605–608.*

This is a brief enumeration of the preclinical signs that might be encountered by the nonindustrial physician in a health examination. Various occupational hazards and poisonings are indicated as the real source of ailments coming under the headings of eyes, nervous and mental conditions,

headache, anemia, skin, nose, throat and ears, mouth.—B. L. G.

PHYSICAL DEFECTS AS REVEALED BY PERIODIC HEALTH EXAMINATIONS. *L. I. Dublin, E. L. Fisk, and E. W. Kopf. Am. Jour. Med. Sciences, Oct., 1925, vol. 170, pp. 576–594.*

From the physical examinations of more than 16,000 white males, it is clear that a wider extension of periodic health examination among the adult population is indicated. Prompt treatment of both major and minor defects thus discovered may lead to the prevention of serious complications later. The most helpful prospect is in the field of weight control. Marked overweight is associated with serious impairment of cardiovascular function according to these figures. This study suggests that there are traces of important connection between premonitory conditions and the later and graver disabling disorders. The facts gathered on hygienic habits indicate the need for greater hygienic instruction. These investigations offer great aid in the field of preventive medicine.—B. L. G.

THE VALUE OF PHYSICAL EXAMINATIONS IN INDUSTRY. *J. N. Redfern. Texas State Jour. Med., Nov., 1925, vol. 21, pp. 414–417.*

This paper is written by the manager of the Relief, Medical Employment and Pension Departments of the Chicago, Burlington and Quincy Railroad Company. He concludes that "an experience of 40 years brings a strengthening conviction that, if properly conducted, and with due regard for the feelings of the individual, physical examinations and reëxaminations are of inestimable value both to the employee and to the employer." Employees who handle food supplies are reexamined every three months at least.—B. L. G.

ROUTINE PATHOLOGICAL EXAMINATION AS APPLIED TO PHYSIOLOGICALLY INEFFICIENT AVIATORS. *H. E. Whittingham. Jour. State Med., Nov., 1925, vol. 33, pp. 511–520.*

The general alertness required in an aviator uses up much nervous energy, and high altitudes accelerate the rate of breathing and the circulation, producing changes in the whole metabolism. This strain may be the direct cause of the pilot's becoming physiologically inefficient, or he may be afflicted by some active disease. By employing standard tests one is able to detect physiologic defects in a man who is then sent to the pathologist for investigation. In the Royal Air Force the flying personnel are systematically kept under physiologic observation. Anyone in whom abnormalities are detected is sent before a special medical board unless the condition can be remedied at the station. In most cases a routine pathologic examination is carried out and the findings correlated with the physiologic data. Since the set of tests are collected within a period of from two to three hours and completed within twenty-four hours, the hospital cost per head is quite small, there being in most cases no need for admission to the hospital. One will find in this article complete descriptions of the numerous tests applied.—B. L. G.

ABSTRACT OF THE LITERATURE OF INDUSTRIAL HYGIENE

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GENERAL

OCCUPATION AND HEALTH. PART III. *Internat. Labour Office, 1925.*

This issue of the international encyclopedia of industrial hygiene, which is being published as ready in brochures, contains nine articles written by L. Carozzi (Geneva), W. I. Clark (Worcester, U. S. A.), B. Chajes (Berlin), P. Boulin (Lille), F. Koelsch (Munich), and Kranenberg (The Hague). It maintains the high level which is characteristic of this valuable work which must become the accepted work of reference in the field of industrial hygiene. The subjects dealt with are lead colors and lead

compounds; red lead; white lead; artificial abrasive and grinding wheels; tetrachlorethane; formaldehyde and formalin; sugar refining; paraffin; and diamond cutting. Each article is compact and deals with manufacturing processes and associated risks, together with a description of illness resulting and hygienic measures required; and closes with legislation adopted in different countries. Dr. Clark in his article which is well illustrated dwells on the comparatively small risk from the dust of abrasive materials as contrasted with silica dust. Sugar refining, an ever-expanding industry, is discussed at some length having regard to the small amount of health risk concerned. The lead articles, particularly the one on white lead, are informative and well written. Paraffin is excellently dealt with by Dr. Koelsch, whose illustrations of skin troubles due to it are good.—E. L. C.

COUNCIL OF INDUSTRIAL MEDICINE. *Health, London, Jan., 1926.*

In 1924, a provisional committee, with Sir Thomas Oliver, M.D., as chairman, was set up as the British Section of the International Medical Congress of Industrial Accidents and Diseases, which held its fourth meeting in Amsterdam during September, 1925, when a number of British representatives attended.

With a view to making this provisional committee a permanent body, it was named the Association of British Industrial Physicians and Surgeons, and, rather than add to the already numerous medical societies, it was decided unanimously to seek its incorporation in an existing organization. This union was eventually effected with the Federation of Medical and Allied Services which had already established close co-operation with industry. The Executive Council, at a meeting held Nov. 3, 1925, approved the formation of the new Council incorporating the foregoing Association, and the first meeting of that Council was held on Friday, Nov. 20, 1925, when Dr. D. A. Coles, Medical Officer of the Gas, Light and Coke Co., was elected Chairman, Sir Thomas Oliver, M.D., and Prof. E. L. Collis, M.D., Vice-Chairmen, Dr. N. Howard Mummery, Medical Director, and Dr. H. S. N. Menko, Foreign Medical Secretary.

Invitations are being extended to all industrial medical officers of health to apply for membership in the Council. It is proposed to hold the Fifth International Medical Congress of Industrial Accidents and Diseases in London in 1927, when some 2,000 delegates may be expected to attend.—E. L. C.

FOURTH INTERNATIONAL CONGRESS ON INDUSTRIAL ACCIDENTS AND DISEASES. *Netherlands Letter, Jour. Am. Med. Assn., Jan. 23, 1926, vol. 86, pp. 290–291.*

This letter continues a summary of papers which were presented at the Fourth International Congress on Industrial Accidents and Diseases held in Amsterdam (see also *Jour. Am. Med. Assn.*, Dec. 5, 1925, vol. 85, p. 1825; Jan. 16, 1926, vol. 86, p. 213). Various papers presented at this Congress have been abstracted elsewhere in THIS JOURNAL. The subjects covered included tumors and trauma, industrial nervous diseases, fatigue, tuberculosis and trauma, com-

pensation for minor injuries, traumatic abdominal affections, traumatic arthritis, industrial malaria, traumatic color blindness, traumatic uterin displacement, partial disability and industrial reeducation, pneumonokoniosis, occupational diseases of women and children, health insurance in relation to industrial disease, vocational guidance, etc.—K. R. D.

FORTIETH ANNUAL REPORT, NEWARK HEALTH DEPARTMENT. 1924. *Abstr. as follows in Am. Jour. Pub. Health, Dec., 1925, vol. 15, p. 1122.*

For the year 1924 the City Health Department investigated 21 cases of lead poisoning, 1 of arsenic poisoning, and 8 other industrial cases. Industrial inspections included 716 of factories, 95 with other inspectors, 43 out of the city, 42 of poultry slaughter houses, 50 nigh inspections, 44 noise complaints, 60 Spanish and Portuguese lodging houses, 35 fat rendering plants, and 3,631 official calls. Reinspections were made of 334 factory instances, 15 poultry slaughter houses, and 17 fat rendering plants.—B. L. G.

HYGIENE DIVISION ANNUAL REPORT, NATIONAL CASH REGISTER CO., DAYTON, OHIO, 1924. *Abstr. in Am. Jour. Pub. Health, Dec., 1925, vol. 15, pp. 1122–1123.*

This mimeographed bulletin represents this Company's co-operation with the United States Public Health Service which is studying absences of all kinds in a number of factories. There were 437 accidents during the year, which was 13.8 per cent. less than the preceding year, and these accidents caused an average of 1.4 hours lost time as compared with 1.9 hours in 1923. Only 123 were lost time cases; forty-two were compensation cases—*i.e.*, where more than one week of lost time was concerned—and received $8,138.47. There were eleven accidents causing permanent disability, one of which was the loss of an eye and all others were hand injuries. These cases caused 2,452 hours of lost time and the compensation cost was $4,914.95. Lost time because of sickness shows a decrease of 10,760 hours, or 6.7 per cent., over 1923, due largely to the absence of an epidemic of any kind, with respiratory diseases causing the greatest lost time. Lost time because of sickness will average 23.5 hours per employee, an increase of 0.2 per cent. Detailed figures are given as to examinations, dispensary services, and accidents. There were 8,147 cases of sickness with maximums in February and November, minimums being in the summer months—total hours lost, 147,545.—B. L. G.

HEALTH INVENTORY OF URBAN AND RURAL STUDENTS. *D. F. Smiley. Nation's Health, Jan., 1926, vol. 8, pp. 21–22.*

The data presented in this article are from the Department of Hygiene and Preventive Medicine, Cornell University. Physical examinations were made during the three years 1921, 1922, and 1923 on a total of 660 agricultural short course students and an equal number of regular students, predominantly urban dwelling. Figures show that the urban group had on an average per individual 3.78 of the acute infectious diseases while the rural group had 3.22. Physical defects seem to be evenly distributed between

urban and rural dwellers—about two and a half defects a piece—with 0.74 of the defects per student remedied by college age in the urban group and only 0.37 in the rural group. Faulty health habits averaged 0.95 per student in the urban group and 1.21 in the rural group.—B. A.

SYSTEMIC OCCUPATIONAL DISEASES: OCCURRENCE, TREATMENT, AND PREVENTION

AN INVESTIGATION INTO THE STATISTICS OF CANCER IN DIFFERENT TRADES AND PROFESSIONS. *M. Young and W. T. Russell with J. Brownlee and E. L. Collis. Med. Res. Council, Special Rep. Series No. 99, pp. 50. H. M. Stationery Office, 1926.*

The reason for the statistical inquiry on which this report is based lay in the recognized occurrence of certain forms of cancer in definite occupations, *e.g.*, scrotal cancer among chimney sweeps. Hence arose the suggestion that possibly other instances might be disclosed by intensive investigation. The material used is concerned with 46,118 male deaths which occurred in 1910 to 1912 from cancer. This total, however, when distributed (1) among 132 occupations or trades and (2) by twelve sites or parts of the body affected, is not large, and liability to considerable random error is introduced. The report first adduces some support for a moderate increase of cancer mortality as we go down the social scale. Next, attention is drawn to wide differences in the comparative mortality figures in occupations, varying from 178 for zinc manufacturers and thirty-seven for barmen to thirty-eight for tobacco manufacturers and forty for coke burners.

Present knowledge is summarized as to predisposing causes of cancer, for which much of the evidence is drawn from occupational exposures to such things as tar, oils, paraffin, arsenic, and aniline; the parts concerned are naturally the surfaces of the body. The claimed beneficial influence of lead is examined and found to lack statistical support. Most interest centers on discussion for different trades of the incidence of cancer in the principal sites of which the skin claims first place; here, among other instances, scrotal cancer shows up among sweeps with their exposure to soot and among mule spinners in the cotton industry exposed to lubricating oil which also affects fitters and turners. Certain oils and distillation products are thus located, which require to be excluded before other things fall under suspicion as causative of cancer. Coal tar is so postulated to cause skin cancer among fishermen, fishmongers, and merchant seamen; and there is evidence of it also being concerned in other occupations. Lip cancer is found high in open air occupations with opportunities for smoking cheap clay pipes; here the prevalence among males, as compared with females, of cancer of the lip, tongue, mouth, jaw, and esophagus is quoted. Tobacco smoke is a distillation product of vegetable matter, just as are soot and

tar. Excessive consumption of alcohol is found associated with cancer of the tongue and esophagus and also of the intestine; but not of the stomach, cancer of which organ belongs rather to mining and quarrying and to the textile trades. Examination for a relationship between different types of cancer establishes (1) a direct association between lingual and esophageal cancer suggestive of a common causal factor; and also between esophageal and intestinal cancer; (2) a slight association between labial and gastric cancer; and (3) inverse relations between esophageal and gastric cancer, gastric and rectal cancer, gastric and lingual, esophageal and rectal, and lingual and rectal. Antecedent syphilis is found associated with lingual and esophageal cancer, but not definitely with cancer of other parts or organs, with the possible exception of the bowel. The authors conclude that no sure evidence has come to light disclosing any new occupational influence in cancer causation, that occupational risk is only one of several predisposing causes of cancer, and that the discovery of any one specific factor is not likely. The report contains a mass of statistical information of great value to other investigators pursuing a similar line of research.—E. L. C.

POISONOUS HAZARDS AND THEIR EFFECTS: GASES, CHEMICALS, ETC.

THE PYROTANNIC ACID METHOD FOR THE QUANTITATIVE DETERMINATION OF CARBON MONOXIDE IN BLOOD AND IN AIR: ITS USE IN THE DIAGNOSIS AND INVESTIGATION OF CASES OF CARBON MONOXIDE POISONING. *R. R. Sayers and W. P. Yant. U. S. Bur. Mines, Tech. Paper 373, 1925, pp. 18.*

This is an excellent summary of the pyrotannic acid technic for carbon monoxide quantitation. It becomes all the more convincing and useful through being presented with examples of practical use in the field. The authors' summary is too modest a note on one of the most useful additions to the technic of evaluating and diagnosing carbon monoxide poisoning which we possess:

A method found to be satisfactory for quantitative analysis of CO in blood and air in cases of CO poisoning is outlined.

A compact field apparatus is described. Owing to its durability, and the ease with which accurate and dependable results can be obtained, it should be of great use in investigations pertaining to the cause, diagnosis, and treatment of CO poisoning.

—C. K. D.

VENESECTION AND BLOOD TRANSFUSION IN CARBON MONOXIDE POISONING. *S. Gordon-Watson. Abstr. as follows from Brit. Med. Jour., Dec. 5, 1925, vol. 2, p. 1049, in Jour. Am. Med. Assn., Jan. 23, 1926, vol. 86, p. 311.*

Gordon-Watson cites six cases of carbon monoxide poisoning resulting from the explosion of ammonol, the explosive of Mills' bombs, in a confined space. The patients were soldiers. The cases presented certain differences, each showing some special characteristic. Little effect was pro-

duced by oxygen. Artificial respiration, combined with the administration of oxygen, was not tried. In two of the worst cases transfusion was done with marked benefit, and the patients probably owe their lives to this measure being carried out. All six patients were bled, and all recovered.—K. R. D.

BLOOD PICTURE IN WORKERS AMONG HCN AND ZYKLON B. *C. M. Hasselmann. Abstr. as follows from Arch. f. exper. Path. u. Pharmakol., 1925, vol. 108, pp. 106–120, in Physiol. Abstr., Dec., 1925, vol. 10, p. 448.*

The hemoglobin content and the erythrocyte count of the blood of workers (100 subjects examined) in factories preparing hydrocyanic acid or derivatives are both raised. There is no change in the white cell count.—B. L. G.

ON NITROUS FUME POISONING. *W. F. Boos. Boston Med. and Surg. Jour., Dec. 10, 1925, vol. 193, pp. 1096–1098.*

Nitrous fume poisoning is one of the most dangerous of industrial poisonings because of its insidious character. It is practically impossible to predicate beforehand the seriousness of the after effects from the initial symptoms. The active poisonous ingredient is nitrogen dioxide (NO_2). When first inhaled it produces a sensation of pain, burning and choking in the throat and chest, the victim coughs violently, and raises yellow-tinged sputum. In most cases these first symptoms are soon relieved in the open air and the worker feels well enough to go home in half an hour or so. As a matter of fact, the real poisoning may then be just beginning to work. This is due to the fact that gradually the nitrogen dioxide is absorbed by the respiratory tract and converted into a solution of nitric and nitrous acids, which produce in time a generalized hyperemia, followed by an extensive extravasation of serum into the alveolar spaces and bronchioles, constituting, in other words, a progressive edema of the lungs. At the end of an hour or so the edema begins to produce symptoms, the cough returns, dyspnea develops, the victim breathes more and more rapidly, becomes progressively more and more cyanotic, and, in a large percentage of cases, finally dies of asphyxia. A certain number of victims recover from the edema only to develop bronchopneumonia. When a case has reached the stage of edema it is too late to do anything except give cardiac stimulation, use oxygen, or apply other symptomatic measures.

Prevention of the edema can be accomplished by inhaling ammonia gas. A mixture is described and the best method for its use is outlined.—B. L. G.

A PORTABLE COMBUSTION APPARATUS FOR DETECTION AND MEASUREMENT OF SMALL QUANTITIES OF PETROLEUM VAPOR. *C. A. Neusbaum, P. L. DeVerter, and E. W. Dean. Indust. and Engin. Chem., Feb., 1926, vol. 18, pp. 183–185.*

An outline of the relative merits of various types of apparatus used for detecting and estimating small percentages of petroleum vapor follows a brief discussion of the requirements of the work of inspecting ship tanks.

A convenient and accurate portable

apparatus which reduces these disadvantages to a minimum and which has been developed and used by the authors is described. This apparatus is, essentially, a compromise between the accuracy and reliability of the Haldane, and the portability of the Burrell methane detector.—P. D.

MICROCHEMICAL STUDIES OF ARSENIC IN ARSENICAL PIGMENTATION AND KERATOSES. *E. D. Osborne. Arch. Dermat. and Syph., Dec., 1925, vol. 12, pp. 773–788.*

"1. There exists a satisfactory method for the microchemical study of arsenic in tissue, which has been employed by the author in the study of arsenical keratoses and pigmentation. A detailed description of the method with controls is given.

"2. A detailed study of arsenical keratoses is given with photomicrographs showing the location of the arsenic deposits. The mechanism of the production of arsenical keratoses is discussed and its bearing on the development of epitheliomas.

"3. A detailed study of arsenical pigmentation is given with photomicrographs showing the relation of the arsenic to all the cutaneous structures. A discussion of the probable action of arsenic in the production of pigment is given."

FUMES FROM SOLDERING STOVES. *C. M. Salls. N. Y. State Dept. Labor, Indust. Hyg. Bull., Dec., 1925, vol. 2, p. 21.*

Tests made by the author show definitely that lead dust is discharged from soldering stoves. In one room in which the tests were made there were 200 soldering stoves, each enclosed in a hood connected to the main exhaust duct by 8 feet of 2-inch flue. The inside diameter of the small flues had been considerably decreased by corrosion and by deposit of fume from the stoves. A sample of the deposit in one of these flues, taken from a point 2 feet above a gas stove, was found to contain 7.12 per cent. of lead. The air in the same room contained 0.053 mg. of lead per cubic meter.

In another room containing eighty soldering stoves there were no hoods nor exhaust systems. The natural ventilation was unusually good, however, and mechanical ventilation was also provided. The air at one end of this room where heavy parts were soldered contained 0.2 mg. of lead per cubic meter; at the other end where light parts were soldered it contained 0.05 mg. Dust deposited on lamp shades 4 feet above the soldering benches contained 9 and 4 per cent. of lead, respectively.—M. C. S.

TEXT OF FULL REPORT OF INVESTIGATION OF HEALTH HAZARDS FROM TETRA-ETHYL LEAD GASOLINE. *J. P. Leake. Treasury Department, U. S. Pub. Health Ser., 1926, pp. 61 and 57 tables (bound separately).*

This is the complete report of the investigation of tetraethyl lead gasoline carried out under the active direction of Surgeon J. P. Leake, United States Public Health Service. The investigation was undertaken as the result of a conference called by the Surgeon General of the United States Public Health Service in May, 1925, and had for its object the determination of a possible health hazard involved in the distribution and hand-

ling of gasoline containing lead tetraethyl. Two hundred and fifty-two men were selected for experimental investigation. They were classified as follows:

Group A.—Thirty-six men using ordinary gasoline and exposed to a degree equal to that of the general public.

Group B.—Seventy-seven men similar to those in Group A but using ethyl gasoline.

Group C.—Twenty-one garage workers handling ordinary gasoline.

Group D.—Fifty-seven garage workers using ethyl gasoline.

Group E.—Sixty-one men exposed to a definite industrial lead hazard.

The examinations were purposely arranged so as to be undertaken "blindly," that is, the identity of the subjects with regard to their exposure was not known to those participating in the investigation with the exception of the physician who took down their industrial history. The clinical examination was conducted very thoroughly and great care was exercised in examining for stippled red cells. Four smears were examined from each subject. The amount of stippling found in each group is here summarized in Table 1.

This examination made very apparent the difference between Group E and the other groups. Group D also shows some increase in stippling over that of the preceding groups but much less in magnitude than that of Group E.

Chemical examination of the feces was made with the greatest care. One cannot fail to be impressed with the attention that was devoted to this important factor. No chemical analyses of urine for lead are reported.

TABLE 1.—NUMBER OF PERSONS IN EACH GROUP DISTRIBUTED ACCORDING TO DEGREES OF STIPPLING[1]

GROUP	STIPPLED CELLS PER 100,000 RED CELLS								TOTAL
	None	Very Fine Granules (Questionable)		Definite Stippling					
		1–3	Over 3	1–2	3–6	7–20	21–100	Over 100	
A	27	4	1	2	..	1	1	..	36
B	61	6	1	7	2	..	..	..	77
C	13	2	1	4	1	..	..	..	21
D	29	2	..	16	5	5	..	..	57
E	3	1	..	6	8	8	16	19	61
Total	133	15	3	35	16	14	17	19	252

[1] From Table 33 of Full Report.

TABLE 2.—NUMBER OF PERSONS IN EACH GROUP SHOWING LEAD IN FECES[1]

GROUP	TOTAL MILLIGRAMS OF LEAD IN FECES					
	0.15 and under	0.16–0.50	0.51–1.50	1.51–5.0	5.01–15.0	Total
A	10	18	3	..	..	31
B	14	32	10	..	..	56
C	2	12	3	..	..	17
D	11	31	10	2	..	54
E	1	6	13	16	5	41
Total	38	99	39	18	5	199

[1] From Table 40 of Full Report.

Table 2 illustrates the fecal excretion of lead by individuals in the various groups. The same trend is apparent in these figures as was reflected with

regard to stippling. Group E shows by far the greatest output of lead and in Group D there is a distinct increase over the preceding groups. It is interesting to note that analyses of "normal" feces, *i.e.*, feces collected from individuals in the laboratory at Washington, showed lead in each case. The amounts varied from 0.138 to 0.725 mg. of lead. This would indicate either that these individuals contained stored lead, were exposed to lead dust or fume, or that they were ingesting lead in their food or drink—a disquieting idea in any case.

Atmospheric contamination with lead was investigated and analyses were made of dust samples collected at various points. It was evident that some lead was present in the air of garages and workrooms whether the gasoline contained lead or not. Sweepings of dust from floors and benches contained amounts of lead ranging from 0.82 to 22.31 mg. per gram of dust. The data collected, however, were insufficient to make apparent any great increase in lead dustiness of ethyl gasoline garages.

Samples of tap water used at each place were taken and analyzed for lead, as well as for calcium and magnesium. Carbon monoxide determinations at the Dayton and Cincinnati test garages at various times of the day showed values ranging from 0 to 9 parts of carbon monoxide per 10,000 parts of air.

The immense amount of data collected within a few months is a striking illustration of teamwork and the investigators responsible for the work deserve great credit for completing it within the allotted time. The results obtained have been summarized in the report of the Surgeon General's Committee[1] and a set of regulations has been drawn up and proposed for controlling the use and distribution of lead tetraethyl as it is applied to ethylizing gasoline.—L. T. F.

MANGANESE POISONING AND ITS EFFECT ON THE CENTRAL NERVOUS SYSTEM. REPORT OF SIX CASES. *R. F. Gayle, Jr. Jour. Am. Med. Assn., Dec. 26, 1925, vol. 85, pp. 2008–2011.*

Gayle reports six cases of manganese poisoning in men who had been engaged in grinding manganese for periods varying from three to ten months. In addition to the clinical symptoms of manganese poisoning, each of the patients in this series showed mental changes. Out of five specimens of urine examined, manganese was detected in three.—K. R. D.

SOME UNRECOGNIZED DANGERS IN THE USE AND HANDLING OF RADIOACTIVE SUBSTANCES, WITH ESPECIAL REFERENCE TO THE STORAGE OF INSOLUBLE PRODUCTS OF RADIUM AND MESOTHORIUM IN THE RETICULO-ENDOTHELIAL SYSTEM. *H. S. Martland, P. Conlon, and J. P. Knef. Jour. Am. Med. Assn., Dec. 5, 1925, vol. 85, pp. 1769–1776.*

This article deals with a new and very interesting form of occupational poisoning on which two other papers have recently appeared—"Necrosis of the Jaw in Workers Employed in Applying a Luminous Paint Con-

[1] For this report see THIS JOUR., 1926, 8, 248.

taining Radium" by W. B. Castle, K. R. and C. K. Drinker (see THIS JOUR., 1925, vol. 7, p. 371) and "Radium (Mesothorium) Necrosis" by F. L. Hoffman (see THIS JOUR., 1926, vol. 8, Abstr. Section, p. 24). The cases studied are ones of illness and death occurring among girls employed in painting the dials of watches and clocks with a luminous paint containing radioactive substances. The cases under observation ranged from mild ones showing a slight necrosis of the alveolar borders of the jaw and without anemia or leukopenia to severe ones showing profound anemia with extensive, almost complete destruction of the upper and lower maxilla. In the one fatal case the authors demonstrated, by means of electrometers, gamma radiations from the body during life and measurable amounts of emanation in the expired air. In the organs after death, amounts of radioactive elements were found, sufficient to be determined quantitatively by alpha radiation and penetrative gamma rays, notably in the spleen, liver, and bones, which represent the largest part of the reticulo-endothelial system.

NECROPSY OF A ROENTGENOLOGIST. *E. C. Piette. Radiology, Dec., 1925, vol. 5, pp. 525–526.*

"The following findings can be attributed to the chronic exposure to X-rays on the human organism: Ulcerative roentgendermatitis, general atrophy of the lymphatic tissue (which probably has fatal significance in this case), irritation of the reticulo-endothelial system, degenerative changes in the reproductive system (which has no depressing influence on the mental or creative forces), diffuse arteriosclerosis of the large vessels, particularly in the brain and heart, and, finally, obliterative pachymeningitis."

PERNICIOUS ANEMIA IN ROENTGENOLOGIST. *J. Lankhout. Abstr. as follows from Nederl. Tijdschr. v. Geneesk., Dec. 19, 1925, vol. 2, p. 2789, in Jour. Am. Med. Assn., Feb. 13, 1926, vol. 86, p. 522.*

The man was director of a roentgen ray laboratory, and had been careless about protecting himself. The blood was of the pernicious anemia type, the color index 1.3 a few days before death.—K. R. D.

OCCUPATIONAL INFECTIOUS DISEASES: OCCURRENCE, TREATMENT, AND PREVENTION

THE HISTORY OF ANTHRAX IN THE WOOL INDUSTRY OF BRADFORD, AND OF ITS CONTROL. *F. W. Eurich. Lancet, Jan. 2, 1926, vol. 1, pp. 57–58; Jan. 9, 1926, pp. 107–109.*

The story is well told in these two articles of the occurrence of woolsorters' disease. The first case in 1847 followed the introduction of alpaca and mohair from abroad. By 1878 the disease was a recognized occupational danger, and Dr. J. H. Bell, who first considered it a septicemia caused by the inhalation of germs produced by decomposition of animal matter, aroused public attention. Soon its similarity to splenic fever in sheep and cattle led to rec-

ognition that the disease was anthrax. Dr. Bell held that sorting of all dry Eastern wool and hair was dangerous, but that the danger could be minimized by steeping the hair first in salt water and then in hot soap and water. Cases continued to occur and government attention was directed to means for its prevention; as a result the preventive measures recommended by Dr. Bell were shown to give little or no security. Employers did their best, but as the way in which the wool remained infected was not clearly understood, their efforts were ineffective. Some advance was made when exhaust ventilation was called for to carry away dust, a requirement which was embodied in statutory regulations. But no real advance occurred until the anthrax bacillus was tracked down to his lair, which, in wool, is the blood stained discharges adhering to the fleece.

To Dr. Eurich himself the credit is due of detecting how the infection clings to wool. Previously efforts at removing the risk to which woolsorters were exposed by removing "fallen" fleeces failed, because, on the one hand, the anthrax bacillus perishes as putrefaction advances, and so the most obviously "fallen" fleeces were not the most infective, while, on the other hand, blood clings to wool even after it has been washed. The steps are described which finally determined that disinfection of all material from countries where anthrax is rife was the only safe method. A disinfectant was required which would kill all anthrax in wool or hair, be harmless to the workers, and be economical; formaldehyde in a 2 per cent. solution at 100°F. possesses these properties. Then the history is given of how its use was worked out in practice for use at the government disinfecting station, Liverpool. All the wool is washed in warm water and alkali and then in a soap bath, being squeezed through rollers as it passes from one bath to the next, and passed into a formaldehyde bath; again it is squeezed and passed into a drying chamber. The result has been thoroughly satisfactory, and today over 2,000,000 pounds of material is disinfected yearly. But 20,000,000 pounds of black-listed raw material are imported annually. Until all dangerous wool is disinfected, danger must remain for the workers. The process has been proved to be industrially practicable. It remains for the list of suspected materials to which it must be applied by statute to be extended.—E. L. C.

INDUSTRIAL ANTHRAX. *Am. Jour. Pub. Health, Jan., 1926, vol. 16, pp. 42–44.*

This is the report of the Committee on Industrial Anthrax of the American Public Health Association, Dr. Henry Field Smyth, Chairman. The Committee has tried to bring statistics on anthrax morbidity and mortality up to date by means of questionnaires to state registrars and health departments and by reference to the United States Bureau of Census "Mortality Statistics." More or less complete reports were obtained from thirty-four states, and the figures are given for cases and deaths by years from 1919 to Sept. 1, 1925. There were 632 cases reported for the period and 177 deaths, exclusive of Mississippi for which cases are not included because

this state did not separate human from animal anthrax. Three states reporting anthrax in 1924 (eight cases in all) report none in 1925, but five states reporting none in 1924 report in all twenty-five cases in the eight months of 1925.

A tabulation is also given of the cases by sources of anthrax infection and by years. The large number of cases reported with source "not stated" might, if fully reported, alter the other figures, but the leather industry, the shaving brush, and animal contact are here given as the sources responsible for the greatest number of cases. Infection due to animal contact is on the increase, but that due to the shaving brush seems to be on the decrease.—B. L. G.

THE TREATMENT OF HUMAN ANTHRAX. *A. Pijper. Lancet, Jan. 9, 1926, vol. 1, pp. 88–89.*

The writer suggests that the earliest and best clinical sign of anthrax is a very extensive edema round a small central lesion. The orthodox treatment is the injection (intravenously) of 30 c.c. of anthrax serum. Smaller doses may be required to be given subcutaneously on the following days. He points out that serum is not always or even generally available. He therefore advises an alternate method which is always at hand and which he has found always effectual. A smear is taken preferably from a vesicle, and is examined. An immediate intravenous injection of neosalvarsan 0.6 to 0.9 gm. is administered, the exact dose depending on the severity of the patient's condition. The injection is repeated again on the second day; it may be given again on the fourth day but this is unusual. No operation is advised. A weak solution of formalin is applied to the pustule. The patient is put to bed and the part immobilized. This treatment, Pijper says, has never failed to cure rapidly in forty successive cases.—R. P. W.

OCCUPATIONAL INFECTION WITH TUBERCULOSIS. *Braeuning. Abstr. as follows from Ztschr. f. Tuberk., Nov., 1925, vol. 43, p. 441, in Jour. Am. Med. Assn., Jan. 9, 1925, vol. 86, p. 159.*

Braeuning publishes his expert testimony on a few cases of infection acquired in the treatment of tuberculous persons.—K. R. D.

TUBERCULOSIS IN BAKERS. *Paris Letter, Jour. Am. Med. Assn., Jan. 30, 1926, vol. 86, p. 362.*

Parisot and Richard (Nancy) observed a mortality of 10 per thousand from tuberculosis among workmen in bakeries in the city of Nancy, whereas the mortality is only from 2.5 to 3 per thousand among the general population of the city. Among cake bakers, the mortality from tuberculosis is nil, and the morbidity is less than 1 per cent. The authors think that this difference is due to night work and to the fact that workmen in bakeries are not restricted by the eight-hour law, and do not have a weekly rest period. Consumers of bakery goods run considerable risk when tuberculous workmen continue with their work.—K. R. D.

OCCUPATIONAL AFFECTIONS OF THE SKIN AND SPECIAL SENSES

THE DERMATOLOGICAL LESSONS OF THE WAR. *G. Thibierge. Ann. de dermat. et syph., Dec., 1925, pp. 705–724.*

In this concluding article the author reviews the question of war melanosis. This was first described in 1917 by Riehl under the title of "a peculiar form of melanosis." Numerous German and Austrian authorities have described the condition. It was practically seen only in the central empires. Bauer and Epstein have recorded instances since hostilities have ended. The visage and uncovered parts of the body assume a yellow-brown to a chocolate color. The nose is often free. The ears and forehead are studded with minute black dots. With a glass they are seen to be the openings of the pilosebaceous glands. Around these points is a zone of dusky redness. On the skin will be found numerous punctate keratoses and a fine furfuraceous desquamation. This shows gray against the dark background when scratched by the nail. Riehl and a large number of writers attribute this coloration to the eating of war bread made from ground beans and wheat. This mixture is supposed to have sensitized the skin of the consumer to the sun's rays (*e.g.*, pellagra). The probable explanation supported by Thibierge and the majority of German authorities is that it was due to the use of impure and coarse types of oils and greases necessitated by the close investment of the central powers.

In 1917 Oppenheim described warty growths on the skin caused by the use in treatment of very impure German-made vaseline. The melanoderma described by Thibierge is exactly similar to that seen among workers in the distillates of oil and tar.—R. P. W.

LACQUER DERMATITIS TREATED WITH RHUS TOXICODENDRON ANTIGEN. REPORT OF A CASE. *C. M. Williams. Arch. Dermat. and Syph., Dec., 1925, vol. 12, pp. 851–852.*

This is the only case ever reported in which lacquer dermatitis has been treated with *Rhus toxicodendron* antigen. "As far as it goes, it is evidence in support of the belief that the poisonous principle in *Rhus vernicifera* is the same as that in *Rhus toxicodendron*, and strong evidence that *Rhus toxicodendron* antigen may be useful in any form of rhus poisoning."—M. C. S.

OCCUPATIONAL INJURIES OF THE EYES. *A. Elschnig. Abstr. as follows from Med. Klin., Dec. 4, 1925, vol. 21, p. 1835, in Jour. Am. Med. Assn., Jan. 23, 1926, vol. 86, p. 316.*

Elschnig reviews a large amount of material concerned with occupational injuries of the eyes. The frequency of accidents to the eyes is much larger on Saturdays than on Tuesdays. An ointment containing oxycyanide of mercury (1:5,000) should be applied immediately, before the patient goes to the physician. The protective eye glasses are not ideal, but necessary. A physician should enlighten the workers repeatedly as to the dangers.—K. R. D.

OCULAR PROTECTION FOR LABORATORY WORKERS. *J. M. Patton. Am. Jour. Ophth., Dec., 1925, vol. 8, pp. 929–933.*

"Cases of ocular injury arising from

laboratory experiments are cited. A collective investigation shows the relative frequency and importance of such accidents. The wearing of any glasses greatly reduces the danger from this cause; and proper protective goggles eliminate it. Experiments reported seem to show that safety in this respect can be attained by enforced wearing of such protection." Illustrations show the forms of goggles used in the experiments.—M. C. S.

OCCURRENCE AND PREVENTION OF INDUSTRIAL ACCIDENTS

THE PERSONAL FACTOR IN ACCIDENT PREVENTION. *W. H. Cameron. Safety Engin., Jan., 1926, vol. 51, pp. 38–40.*

The author believes that through education of the individual 90 per cent. of all accidents can be prevented. About 70 per cent. of accidents are due to physical, mental, or moral defects of the persons involved; the remaining 30 per cent. may be charged to machines.

The first step in accident prevention is to have the worker examined mentally and physically at the time of employment, so that he may be assigned to an occupation for which he is fitted. Safety rules and posters are important parts of the safety program, but the author stresses the value of the personal touch—if you show the man that you are sincerely interested in him, he will respond in the right way. If the right attitude toward safety is developed in the department, the men themselves will do the rest.—M. C. S.

PREVENTING EXPLOSIONS AND FIRES. *C. W. Mowry. Factory, Jan., 1926, vol. 36, p. 57.*

Fires due to ignition by static electricity of the fumes of benzine used in rubber cement frequently occur in spreader rooms of rubber factories. The Factory Mutual Laboratories found that a relative humidity of 40 per cent. or more would prevent the generation of static electricity, and recommended to one factory which had had 122 such fires in three years that a small jet of steam be allowed to escape into the atmosphere. As a result, no fires have occurred for eighteen months.

A study is now being made of dust explosions which sometimes occur in starch factories and grain elevators. It has been found that windows, hinged at the top so as to swing outward freely, relieved the bursting pressure caused by the rapid combustion of the fine dust particles. One square foot of hinged window area for every 50 cubic feet of volume was sufficient to vent safely any dust explosion that could be produced.—M. C. S.

SAFE PRACTICES FOR MAINTENANCE AND REPAIR MEN. *Safe Practices Pamphlet No. 70, Nat. Safety News, Jan., 1926, vol. 13, pp. 45–52.*

INDUSTRIAL ACCIDENTS AND FATAL DISASTERS IN PRUSSIA. *Berlin Letter, Jour. Am. Med. Assn., Jan. 9, 1926, vol. 86, pp. 133–134.*

Fairly reliable statistics are available with reference to notifiable industrial accidents, although many accidents

of ordinary occurrence go unrecorded. The number of accidents occurring in 100 industrial establishments has dropped from 111 in 1913 to eighty in 1924. In 1913, there were fifty-four accidents to 1,000 workmen, and in 1924 the number was decreased to forty-five. In 1913, there was one fatal accident recorded for every 150 industrial establishments and for every 2,000 workmen, whereas in 1924 there was a fatal accident for every 300 establishments and for every 4,000 workmen. This marked betterment is due mainly to improvements in the safety devices on machines, to the education of the workmen through instruction in the avoidance of accidents, and to the better preparations for first aid. . . . .—K. R. D.

INDUSTRIAL SURGERY

TREATMENT OF BURNS CAUSED BY ACID OR ALKALI. *W. H. Hinkel. Nation's Health, Dec., 1925, vol. 7, pp. 828–830.*

Following an acid or alkali burn the first step in treatment is the removal of the chemical by copious application of water—warm, if possible—and the use of a weak acid or alkali, as indicated, to neutralize what remains of the offending substance. The treatment which then follows is the same as for other burns. There is danger of the patient's going into shock. A workman should not be left alone in a room where there are acids and alkalies and in each such room there should be showers which can be turned on at any time.—E. S. C.

TANNIC ACID IN THE TREATMENT OF BURNS. *E. C. Davidson. Surg., Gynec., and Obst., Aug., 1925, vol. 41, pp. 202–221.*

THE MANAGEMENT OF INDUSTRIAL BURNS; SPECIAL REFERENCE TO TANNIC ACID THERAPY. *E. C. Davidson. Indust. Doctor, Dec., 1925, vol. 3, pp. 179–183.*

TREATMENT OF BURNS. *J. H. Lewis. Indust. Doctor, Jan., 1926 vol. 4, pp. 3–8.*

Following a general consideration of burns—etiologic agents, classification, and complications—the author outlines the technic of tannic acid therapy. The blebs which have been formed are opened and the burned area is covered with dry sterile gauze pads held in position by a loosely applied sterile bandage. The dressing is kept saturated with a 2.5 per cent. aqueous solution of tannic acid. When more than a third of the total body is burned, a 5 per cent. solution has been used in order to obtain a more immediate coagulation. After twenty-four hours, if the burned area has assumed a light brown color, all the dressings are removed; if the surface is still red and moist, the tannic acid compresses are continued until coagulation takes place. The burn is then exposed to air. If part of the involved area contains burns of the third degree, after danger of toxemia has passed and the second degree burns are healing satisfactorily, a wet dressing may be applied or a débridement done to shorten convalescence.

It has been the author's experience that in burns treated in this way toxemia is lessened and infection is a negligible factor. The control of infection has had a definite effect in lessening the amount of scar tissue formation and in preventing the development of contractures.

The second paper, by Dr. Lewis, led the discussion of Dr. Davidson's paper. After describing methods which he had tried since 1904 in his treatment of burns, Dr. Lewis gives the treatment he now uses: a 2 per cent. boric acid ointment with vaseline base. The vaseline is sterilized in a water bath and the boric added, being stirred as it cools to prevent precipitation of the boric. Under sterile conditions the ointment is then spread very liberally on sheets of surgeon's lint which are cut in various sizes, folded, and set away in sterile jars, ready for unfolding and immediate application. He tried the paraffin treatment but found no advantage which the boric ointment method did not provide, and the latter had the added advantage of being quickly applied.

Report of Committee on Questionnaires on Treatment of Burns. *Indust. Doctor, Jan., 1926, vol. 4, pp. 18–20.*

From the thirty-five returns to the questionnaires on burns we may draw the following conclusions:

For first degree burns from liquids, solids, or flames, ointment dressings or solution for wet dressings are indicated. In first degree burns, electrical, wet dressings are favored.

Wet dressings were also advised in second degree burns from liquids, solids, flames and chemicals.

In third degree burns ointments are preferred.

There is great necessity for combating shock and relieving pain by judicious use of morphine. Reference was made to the great importance of elimination and constitutional treatment. Any particular method or technic should accomplish for the patient relief of pain, rapid healing, and the prevention of deformities. Any method which is to be successful should combine also ease of application.—B. L. G.

INDUSTRIAL PHYSIOLOGY: NUTRITION, METABOLISM, FATIGUE, ETC.

Respiration in Anaesthesia: Control by Carbon Dioxide. *Y. Henderson. Brit. Med. Jour., Dec. 19, 1925, vol. 2, pp. 1170–1175.*

The Absorption and Elimination of Volatile Substances through the Lungs: Anaesthesia, Poisoning by Gases and Vapours in Industry, Treatment of Asphyxia. *Y. Henderson. Ibid., Jan. 9, 1926, vol. 1, pp. 41–46.*

The first of these lectures is devoted to considerations of the physiology of respiration in relation to anesthesia and to the value of carbon dioxide for controlling breathing. Overbreathing, while a person is going under, may cause acapnia, due to depletion

of carbon dioxide; then the anesthetic does the rest, and breathing stops. Simultaneous administration of carbon dioxide prevents acapnia and all goes well. Inhalation of carbon dioxide, in controlled amounts, deepens breathing and may be used in alcoholic stupor to expedite the volatilization from the lungs of the excess of alcohol in the blood.

Our readers will find more interest in the second lecture where the principles stated are applied to the treatment of asphyxia due to poisoning by gases and vapors in industry. Volatile substances entering the body by the lungs are far more poisonous than are solid substances, for example the symptoms of lead poisoning from volatile tetraethyl lead are more rapid than and quite unlike ordinary lead poisoning. Evidence is given that the laws of gases apply to this field of phenomena, whether the gas be neutral or toxic. With regard to irritant vapors, the more soluble the gas the more it attacks the upper respiratory passages when the respiratory reflex of coughing acts as a protective warning. Substances of slight solubility—*e.g.*, phosgene and oxides of nitrogen—get down into the lungs and cause acute edema some hours later. Carbon monoxide has no irritant action, but it poisons by causing anoxemia. The number of deaths due to illuminating gas rises out of proportion to the amount of carbon monoxide in the gas supply; in New York City such deaths from asphyxiation approach 500 each year. The automobile has increased this risk in closed garages, in long tunnels, and in assembling and repair shops where mechanics experience severe headaches, with nausea and irritability. The richer in petrol the mixture supplied to the engine, the more carbon monoxide, rather than carbon dioxide, there is in the exhaust gases; and the lower is the mileage efficiency per pound of petrol. In this respect the British less highly powered car has an hygienic advantage over the American. All exhaust gases should be discharged upward from taxicabs and motor buses. Administration of oxygen is indicated to counteract carbon monoxide anoxemia; it is much aided by the addition of about 5 per cent. carbon dioxide to stimulate deep breathing. A useful second best treatment is treatment with air containing about 5 per cent. carbon dioxide—a relatively cheap and portable method. Carbon dioxide appears to prevent pneumonia following oxygen inhalation. In cases of carbon monoxide asphyxia the deep breathing treatment with carbon dioxide should always be maintained for an hour or more in order to ventilate all the poison out of the lungs.—E. L. C.

A Comparison of Breath-Holding Tests with Vital Capacity in Health and Disease. *F. W. Wittich and J. A. Polczak. Am. Rev. Tuberc., Jan., 1926, vol. 13, pp. 54–61.*

These observers made a series of vital capacity and breath holding tests in 275 normal males and sixty-three females, breath holding being done in two ways, first, after a full inspiration, and, second, during normal breathing at the end of expiration. One hundred and thirty-nine cases of tuberculosis were similarly examined and show a fall from the normal figures, worst in the most advanced cases. No evidence is given that the breath

holding maneuver is of conspicuous value.—C. K. D.

UNDERWEIGHT REDUCED AMONG ADULT EMPLOYEES IN INDUSTRY. *Nation's Health, Jan., 1926, vol. 8, p. 23.*

Successful experimental work of the Marion County Tuberculosis Association with child nutrition in Indianapolis public schools led to an extension of their nutrition plan to thirty-one women employees of the Eli Lilly Company who were markedly underweight. A program which included changes in the daily living schedule of each woman, physical examination, remedy of certain physical defects, and daily rest periods with mid-morning and mid-afternoon lunches resulted in an average gain of 4.15 pounds in thirteen weeks.—E. S. C.

THE BLOOD PRESSURE IN AVIATORS. *R. Cruchet. Abstr. as follows from Presse méd., Nov. 11, 1925, vol. 33, p. 1489, in Jour. Am. Med. Assn., Dec. 26, 1925, vol. 85, p. 2058.*

Cruchet reiterates that under the low air pressure at high altitudes the arterial pressure in the flyers increases. The pressure becomes normal and all other phenomena of flight sickness disappear as soon as oxygen is regularly inhaled. He asserts that the influence of oxygen is still manifest at an altitude of 8,000 meters, and probably even higher. Even the untrained can bear without harm an air pressure corresponding to an altitude of 8,000 meters if they inhale oxygen regularly. He gives charts showing the regular rise and fall of the blood pressure above and below normal as the atmospheric pressure in the air chamber was varied to correspond to very high altitudes or to sea level.—K. R. D.

STUDIES ON MUSCULAR WORK. *E. Atzler, R. Herbst, G. Lehmann, and E. Müller. Abstr. as follows from Arch. f. d. ges. Physiol. (Pflüger's), 1925, vol. 208, pp. 184–244, in Physiol. Abstr., Jan., 1926, vol. 10, p. 533.*

Observations were made on man with the Zuntz-Geppert respiration apparatus during work by lifting weights, by turning cranks, by supporting weights, and in course of various postures. The paper is too full of detail to abstract concisely.—B. L. G.

MODERN CONCEPTIONS OF THE PHYSIOLOGY OF WORK. *Vienna Letter, Jour. Am. Med. Assn., Jan. 30, 1926, vol. 86, p. 363.*

At a recent meeting of the Vienna biologic society, Professor Rubner spoke on "Muscular Performance in Man." He discussed the problem from two different angles, that of industrial work and that of physical exercise for the purpose of health culture. In spite of machines and chemistry, the demand for man power is still very great. Researches reveal that metabolic exchange consists of three distinct forms: (1) basal metabolism; (2) the specifically dynamic increase of metabolism resulting from food intake; and (3) work metabolism. The first type represents the extent of oxidation processes while fasting and in a condition of muscular rest. Through food intake the metabolism is increased in proportion to the quantity and quality of food ingested. For motor performance a still further

increase of metabolism is required. The city dweller—especially the sedentary worker—whose exercise consists mainly in walking to his office and back, has a daily metabolism of approximately 2,600 calories, 24 per cent. of which is expended in muscular work. On the other hand, the metabolic exchange of persons engaged in hard labor—wood choppers, for example, who perhaps perform the severest labor of any class—amounts to 5,600 calories daily, more than 60 per cent. of which is applied to muscular work. It will usually be noted that the protein intake increases in direct proportion with the number of calories consumed. The standard of muscular performance for a human being is usually placed at one-eighth horse power. The question as to the duration of a normal working day cannot be decided solely on a hygienic basis. Questions of prudence enter very largely into the matter. Climatic, economic, and eugenic factors are important. Also the kind of clothing worn by workmen has a bearing, because the blood vessels that supply the skin and the muscles are still distended and surcharged after the work is done. An undue loss of heat may occur, which may produce a chilling of the body.—K. R. D.

HAZARDS OF COMPRESSED AIR, DIMINISHED PRESSURE, GENERATION AND USE OF ELECTRICITY, AND ELECTRICAL WELDING

HEMATOMYELIA IN CAISSON DISEASE. *Rio de Janeiro Letter, Jour. Am. Med. Assn., Jan. 2, 1926, vol. 86, pp. 52–53.*

One of the workers in the breakwater at Cobras Island, after working under heavy pressure, 23 meters under the sea, rushed through the decompression process. The result was a hemorrhage in the lower spinal cord and a paralysis of the lower extremities. This paralysis was sudden and at first complete. It showed, however, a tendency to improve after a while, and the patient can now move about. A condition of persistent paresis still remains. The tendon reflexes, at first exaggerated, are now abolished. Babinski's sign shows attenuation. The lower members contract under plantar stimulation, thus proving the existence of automatism and defense reflexes. All sensations of heat and pain disappeared during the first days of the disease, but this analgesia has now changed into hyperalgesia, although the heat sensation is still defective. The tentative diagnosis was a hemorrhage in the cord. Transitory embolisms usually cause plegic symptoms, as described by Dejerine under the name of spinal intermittent claudication.—K. R. D.

ACCIDENTS DUE TO ELECTRICITY AND TREATMENT IN ELECTRIC SHOCK SIMULATING DEATH. *Vienna Letter, Jour. Am. Med. Assn., Dec. 26, 1925, vol. 85, p. 2048; Wien. klin. Wchnschr., Oct. 22, 1925, vol. 38, p. 1155.*

This is a brief review of a lecture by Jellinek on the etiology, pathology,

and treatment of accidents due to electricity. Wounds due to electricity are not true burns; they are generally grayish white, circular and firm, without a trace of reactive inflammation in the adjoining area. After a latent stage, an aseptic necrosis sets in without any general manifestations, even though there has been extensive oss of substance. The prognosis is good if such injuries are treated conservatively.

The remedy for electric shock simulating death is artificial respiration which must be applied as soon as possible after the accident and may need to be continued for many hours. Yet the artificial respiration is frequently done in a way which kills the injured person (aspiration of gastric contents in lungs).—K. R. D.

WOMEN AND CHILDREN IN INDUSTRY

Weighed in the Scales of our Neighbors. *Am. Child, Jan., 1926, vol. 8, pp. 4–5.*

The European child labor standards in regard to age limit, night work, and daily hours of labor are shown graphically by way of comparison with the standards prevailing in the United States—namely, the 14-year age limit for entrance to all occupations except domestic service and agriculture; an eight-hour day and prohibition of night work for all persons under 16 years of age; and the securing of a work permit issued under the following conditions: after completion of the eighth grade, after physical examination, and bearing legal evidence of age.

A large proportion of European countries have the 14-year limit for entrance to industry, and the 18-year limit for night work and for the eight-hour day. In general their standards compare favorably with our own.—M. C. S.

Accidents to Working Children in Massachusetts. *U. S. Month. Labor Rev., Dec., 1925, vol. 21, pp. 1273–1274; Nat. Safety News, Jan., 1926, vol. 13, pp. 12–14.*

During the year ending June 30, 1924, 2,965 industrial accidents were sustained by children under 18 years of age in Massachusetts. Of this number ten were fatal and eighty-six caused permanent partial disability. Three of the fatal accidents were in boys 14 or 15 years old, and seven in boys 16 or 17. They were all preventable but in only two cases could ground for prosecution of the employer be established.

Of the accidents causing permanent partial disability, fourteen occurred to children 14 or 15 years of age, and seventy-two to children 16 or 17. Seventeen were girls.

Emphasis is placed on the importance of training the children before putting them to work on machinery and on the importance of first aid treatment. In the group of children 16 to 17 years old two were hurt on their first day at work, five in less than a week after beginning work, eleven in less than a month, and fifty-five in less than a year.

Comparative accident data are given for each year since 1917. The total number of accidents for both children 14 to 15 and those 16 to 17 years of age was lowest in 1922.

The report concludes as follows:

> The outstanding feature in the study of injuries during the 12 months included in this report is the fact that a very large number of accidents to minors is preventable. But few occurred as a result of violating statutes requiring the safeguarding of machinery or from failure to comply with regulations prohibiting employment in dangerous trades. Efficient factory inspection, coupled with active interest in the prevention of accidents, must be maintained to keep the frequency of industrial injury at the lowest point. Education still remains an important factor. It should have prominent place in the plant experience of each employee. The product of this training will be the careful workman, who constitutes the best safeguard.

—M. C. S.

INDUSTRIAL SANITATION: FACTORY CONSTRUCTION, ILLUMINATION, VENTILATION, HEATING, WATER SUPPLY, SEWAGE DISPOSAL

THE VENTILATION OF LARGE VATS. *F. H. Stebbins. N. Y. State Dept. Labor, Indust. Hyg. Bull., Dec., 1925, vol. 2, p. 22.*

A drawing is given showing a small power driven fan for ventilating large vats such as those used in the manufacture of cider, acids, and in connection with tanning. By using this fan the author believes that the hazard to cleaners may be overcome.—M. C. S.

HAS AIR A VITAL PROPERTY? *F. E. Hartman. Jour. Am. Soc. Heating and Ventil. Eng., Feb., 1926, vol. 32, pp. 67–72.*

The author points out that the optimum combinations of temperature, humidity, and air movement have been formulated (see THIS JOUR., 1926, vol. 8, p. 5) but that much remains to be learned of the vital property of air—if this property exists.

The author states that ozone is not advocated as a germicide in ventilation because it cannot be employed in the quantities necessary for germicidal action. It will, however, attack products of putrefaction like "trimethylamine, indole, skatole, etc., oxidizing them [not masking them] to odorless and innocuous products."

The author cites several examples of therapeutic applications of ozone in support of his suggestion that ozone imparts to the air, by ionization, electrical activity which may otherwise be lacking. This deficiency applies particularly to mechanically ventilated buildings.—P. D.

INDUSTRIAL MEDICAL SERVICE: MEDICAL DISPENSARIES AND HOSPITALS IN INDUSTRIAL PLANTS

OLD WORKERS IN INDUSTRY REMAIN IN GOOD HEALTH. *W. I. Clark and E. B. Simmons. Nation's Health, Dec., 1925, vol. 7, pp. 812–814.*

and treatment of accidents due to electricity. Wounds due to electricity are not true burns; they are generally grayish white, circular and firm, without a trace of reactive inflammation in the adjoining area. After a latent stage, an aseptic necrosis sets in without any general manifestations, even though there has been extensive oss of substance. The prognosis is good if such injuries are treated conservatively.

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During the year ending June 30, 1924, 2,965 industrial accidents were sustained by children under 18 years of age in Massachusetts. Of this number ten were fatal and eighty-six caused permanent partial disability. Three of the fatal accidents were in boys 14 or 15 years old, and seven in boys 16 or 17. They were all preventable but in only two cases could ground for prosecution of the employer be established.

Of the accidents causing permanent partial disability, fourteen occurred to children 14 or 15 years of age, and seventy-two to children 16 or 17. Seventeen were girls.

Emphasis is placed on the importance of training the children before putting them to work on machinery and on the importance of first aid treatment. In the group of children 16 to 17 years old two were hurt on their first day at work, five in less than a week after beginning work, eleven in less than a month, and fifty-five in less than a year.

Comparative accident data are given for each year since 1917. The total number of accidents for both children 14 to 15 and those 16 to 17 years of age was lowest in 1922.

The report concludes as follows:

> The outstanding feature in the study of injuries during the 12 months included in this report is the fact that a very large number of accidents to minors is preventable. But few occurred as a result of violating statutes requiring the safeguarding of machinery or from failure to comply with regulations prohibiting employment in dangerous trades. Efficient factory inspection, coupled with active interest in the prevention of accidents, must be maintained to keep the frequency of industrial injury at the lowest point. Education still remains an important factor. It should have prominent place in the plant experience of each employee. The product of this training will be the careful workman, who constitutes the best safeguard.

—M. C. S.

INDUSTRIAL SANITATION: FACTORY CONSTRUCTION, ILLUMINATION, VENTILATION, HEATING, WATER SUPPLY, SEWAGE DISPOSAL

THE VENTILATION OF LARGE VATS. *F. H. Stebbins. N. Y. State Dept. Labor, Indust. Hyg. Bull., Dec., 1925, vol. 2, p. 22.*

A drawing is given showing a small power driven fan for ventilating large vats such as those used in the manufacture of cider, acids, and in connection with tanning. By using this fan the author believes that the hazard to cleaners may be overcome.—M. C. S.

HAS AIR A VITAL PROPERTY? *F. E. Hartman. Jour. Am. Soc. Heating and Ventil. Eng., Feb., 1926, vol. 32, pp. 67–72.*

The author points out that the optimum combinations of temperature, humidity, and air movement have been formulated (see THIS JOUR., 1926, vol. 8, p. 5) but that much remains to be learned of the vital property of air—if this property exists.

The author states that ozone is not advocated as a germicide in ventilation because it cannot be employed in the quantities necessary for germicidal action. It will, however, attack products of putrefaction like "trimethylamine, indole, skatole, etc., oxidizing them [not masking them] to odorless and innocuous products."

The author cites several examples of therapeutic applications of ozone in support of his suggestion that ozone imparts to the air, by ionization, electrical activity which may otherwise be lacking. This deficiency applies particularly to mechanically ventilated buildings.—P. D.

INDUSTRIAL MEDICAL SERVICE: MEDICAL DISPENSARIES AND HOSPITALS IN INDUSTRIAL PLANTS

OLD WORKERS IN INDUSTRY REMAIN IN GOOD HEALTH. *W. I. Clark and E. B. Simmons. Nation's Health, Dec., 1925, vol. 7, pp. 813–814.*

At the Norton Company of Worcester, Mass., 2 per cent. of the workers are 65 years old or older. An investigation of the work these men can do and an analysis of their physical condition shows a surprising uniformity of good health and lack of signs of degenerative disease. Whatever defects are present are about what one would expect in men of over 65, and do not interfere with the work that the men are doing.—E. S. C.

TYPE OF MEDICAL SERVICE VARIES IN INDUSTRIAL PLANTS. *H. D. Brown. Nation's Health, Nov., 1925, vol. 7, pp. 738–740.*

A recent survey made by the Philadelphia Health Council and Tuberculosis Committee, co-operating with the Philadelphia Association of Industrial Medicine, showed that of the concerns having more than 300 employees 73 per cent., and of those employing 25 to 300 persons, 49 per cent. had some sort of medical service. With a minimum of dispensary, physician and nurse, medical service was considered "complete;" where there were one or perhaps two of these features the service was termed "incomplete;" and service that consisted of having a physician on call, or the services of a first aid attendant, was classified as "emergency." An attempt was also made to determine in a general way the nature of the medical service provided.—E. S. C.

A DEPARTMENT STORE HEALTH SERVICE. *W. Webb. Hosp. Management, Dec., 1925, vol. 20, p. 64.*

For a number of years Lord & Taylor, a large department store in New York City, have maintained for their employees a hospital and free medical work, also dental, chiropodist, and visiting nurse services. The success of the experiment has been proved of material aid and the cost has been more than compensated for by the increased efficiency. Routine physical examinations are maintained on entry and reexamination is conducted annually. A milk clinic is operated by the store so that underweight and poorly nourished employees may also have this benefit. The result makes possible a force of employees who give excellent service and who are trained to take care of their health.—B. L. G.

SMALL FACTORY DISPENSARY MAY BE RUN ECONOMICALLY. *M.S. Rossy. Nation's Health, Nov., 1925, vol. 7, p. 744.*

Massachusetts companies which resented the passage a few years ago of a law requiring first aid rooms in establishments employing 100 or more workers are now in favor of it. A brief description is given of a dispensary room in a factory with 600 employees. Equipment was made or installed at low expense, and a graduate nurse who had recently completed her training was engaged, who could handle first aid dressings and common ailments. It was found that about two patients a week were so seriously hurt that it was necessary to call a doctor. The average cost per patient for treatment in the dispensary was about 42 cents.—B. A.

GARY HOSPITAL OF THE INDIANA STEEL COMPANY. *Nation's Health, Dec., 1925, vol. 7, pp. 831–833.*

As a physical plant the Gary Hospital of the Illinois Steel Company,

Gary, Ind., was built with special attention to facilities for surgical care of the injured. The four distinct departments on the first floor are the administrative, receiving, dispensary, and culinary, each able to function without using the main corridor. The second, third, and fourth floors are divided into small wards and private rooms with a view to grouping cases as to race, nationality, and severity of injuries.

The hospital pays particular attention to physiotherapy, which is as closely co-ordinated with the treatment as a whole as is the medical emergency service. The same man who diagnoses the patient's injury when he is first received decides when he may be sent back to work.— E. S. C.

INDUSTRIAL NURSING

THE NURSE A FACTOR IN SAFETY. *P. I. Ostrander. Hosp. Management, Dec., 1925, vol. 20, pp. 62, 64.*

Industrial nursing represents a very difficult position. The foremost aim is to improve health and efficiency of the workers by safety and by health education. Such a nurse can become a factor in the prevention of accidents not only by timely first aid but also by gaining the employees' confidence and constantly striving to educate them along the line of safety.—B. L. G.

INDUSTRIAL PERSONAL AND COMMUNITY HYGIENE: HOUSING, ETC.

HYGIENIC DWELLINGS FOR WORKING MEN. *Bucharest Letter, Jour. Am. Med. Assn., Dec. 26, 1925, vol. 85, pp. 2046–2047.*

Hygienic dwellings for working men and chiefly for agricultural laborers in Roumania have been provided since 1919 by means of government grants, a sum having been included for that purpose in each year's budget. The annual expenditure from 1919 to 1924 amounted to $15,000, but the demand for cottages grew until this year the annual grant was increased to $24,000. As it is certain that this amount also will prove inadequate, an Act will be passed that will authorize the conversion of $24,000 capital into interest, thus making it possible to build about 1,000 cottages yearly. Another clause of the same Act provides that in the case of land being sold by the local authorities to laborers for building purposes, all the necessary plans, surveys and contracts are to be made by the minister of agriculture at state expense. The interests of the laboring classes are safeguarded by the Act in a variety of other ways. For instance, land selected for building purposes must be suitable as regards soil, air, and drinking water; and speculation by the builder or contractor is forbidden. Conditions of the sale or loan, terms of the loan, and the general plan must be favorable to the laborer. During the period allowed for repayment, the property cannot be seized

for debt, divided, encumbered, or alienated in any way; exemption from taxation is granted for fifteen years. Preference is given in selection of sites to applications coming from localities which make a free grant of land either for house or for gardens. Materials are forwarded at cost price on government railways, but state assistance is granted only for buildings designed to accommodate one family. Each cottage occupies a plot of from 1,000 to 1,200 square yards, and the cost of building varies from $200 to $350. Loans may be repaid in annual instalments, extending over twenty or twenty-five years. Under the Act of 1920, 7,500 workmen's cottages were built in one year. Another result of this Act has been to abolish land speculation, and to keep down the cost of building sites. Owing to the fact that most Roumanian parishes own the adjacent country, which formerly was used as common land to supply fuel and pasturage, this land is now convenient for the erection of workmen's dwellings.

But the care of the state is not confined only to the housing of agricultural laborers. A law has been passed which authorizes the construction of houses in the larger cities for employees of both state and private enterprises, the government undertaking the building of the houses, setting aside a sum for that purpose. Actual construction will begin in 1926. The average building cost of a two-room flat is $640; the average yearly rental amounts to $50. A flat of three rooms and kitchen costs from $950 to $1,000, and may be rented for $60 a year.—K. R. D.

INDUSTRIAL PSYCHOLOGY AND INDUSTRIAL MANAGEMENT IN ITS HEALTH RELATIONS

TESTS FOR COLOR SENSE IN RAILROAD EMPLOYEES. *Schaaff. Bull. de l'Acad. de méd., Paris, Nov. 3, 1925, vol. 94, p. 952.*

ON CERTAIN EFFECTS OF LONG SPELLS OF REPETITIVE WORK. *M. D. Vernon. Brit. Jour. Psychol., Jan., 1926, vol. 16, p. 222.*

In order to follow up the work of former observers on long spells of repetitive work, two tests were carried out by two subjects over periods of time varying from four hours to forty-four (the latter period being divided into spells of work similar to those of the industrial working week). The first test consisted of folding and cutting pieces of paper in certain prescribed patterns; the second, in tracing metal mazes with a metal stile, contact with the edge of the maze being recorded electrically. The average speed and accuracy of performance of this repetitive work varied only slightly, a result which did not agree with those of former observers. It was found, however, that the work of both subjects showed a tendency to alternate accurate and inaccurate periods, and the latter synchronized with periods of feelings of boredom on the part of the subject. It was concluded that results obtained with this type of work under experimental conditions varied with the subject, and were to some extent dependent on his temperamental liability to extreme boredom when carrying out such work.—H. M. V.

ABSTRACT OF THE LITERATURE OF INDUSTRIAL HYGIENE

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GENERAL

SOCIAL WELFARE. INDUSTRIAL MEDICINE AND HYGIENE IN THE LARGE COAL MINES OF BELGIUM. *Stassen. Rev. d'hyg., Nov., 1925, vol. 47, pp. 929–949.*

The part played by medical men in industrial hygiene can be divided into three periods: (1) before the Revolution, which is of historical interest only; (2) the nineteenth century, the period of patronage by employers in which the medical man was only rarely called in for advice on the problems of hygiene and acted solely as a healer—in some collieries a certain sum of money was set apart for medical purposes and any surplus left, after drugs and dressings had been paid for, was allotted to the local medical men who therefore received remuneration in inverse ratio to the amount of work done—in many industrial districts the medical man was looked upon as a *parasite bienfaisant;* (3) the period of industrial medicine which dates from the beginning of the twentieth century. Now begins an intimate collaboration between employers, medical men, and workmen and intervention by public authority. In 1900 an epidemic of ankylostomiasis decimated the coal workers of the Ans-Montegnée area and the coal owners abandoning the famous formula that "the coal owner is sole master of his business" accepted the advice of medical men and the

intervention of the government. Research bodies were formed, the laboratories of Liége and Mons took up the study of the parasite, and practical means were soon devised to combat the ravages of the disease. It was established that prophylaxis was the important factor. The medical men were able to veto the admission of infected workmen to underground work, and for the first time in Belgium medical men took an active part in regulating the conditions of work. The work of Mr. Henry, one of the leading colliery owners, helped largely in bringing about an intimate collaboration between medical men and colliery engineers in the organization of work.

Dr. Stassen gives a list of the various commissions dealing with the duration of working hours, provision of rescue apparatus, pensions for old workmen, baths, etc. Inspector General Glibert is given great credit for work on general hygiene, prevention of accidents, and establishment of dispensaries, and for improvement in the lighting of mines. After the war a Royal Commission established the rights of workmen to a supply of free coal, the supply of first aid appliances, and the medical examination of youthful workmen. Friendly societies have been established which provide medical treatment for the injured workmen and for illnesses in the family. Since 1923 about 10 per cent. of the men working in Belgian mines are foreigners, and it has been found a little difficult to provide medical relief for these men as they are continually moving from place to place. Beds are reserved for them in the local dispensaries.

The present position of the Belgian coal worker is as follows: In addition to his ordinary wage he receives a grant for children and 300 to 400 kilos of free coal a month. In case of accident he receives 50 per cent. of his average daily wage until cure is complete or in the case of permanent incapacity he is allotted a pension which corresponds to half of his general average wage. In case of death the widow and children receive a pension.

In illness the workman receives for six months 25 per cent. of his average daily wage. In many districts there is also free medical attendance and if the member belongs to a friendly society he may receive 5 to 6 francs a day in addition. If the man is incapable of remunerative work and if he has had twenty years of service and is less than 55 years old he receives a pension of 2 francs a day from the national funds. If he is over 55 years he receives a minimum annual pension of 1,440 francs. At 60 every coal worker is entitled to a yearly pension of 1,440 francs.

Special benefits such as baths, eating houses, friendly societies, building societies, co-operative stores, hospitals, dispensaries, and convalescent homes are available in certain districts. Through these benefits which are provided at an annual cost of 150,000,000 francs the miner receives what has been calculated as a 12 per cent. addition to his ordinary wage.—T. L. L.

INDUSTRIAL DISEASES: ANALYSIS OF FACTORY INSPECTION REPORTS, 1920–1922: I. *Internat. Labour Rev., Feb., 1926, vol. 13, pp. 237–248.*

This article is the first part of a study which will be completed later.

It contains a summary and analysis of information on industrial hygiene and pathology provided by the factory inspection reports of various countries. The article is itself a summary which does not lend itself to abstraction. The countries dealt with are: Germany, Austria, Belgium, France, the United States, Switzerland, Great Britain, and the Netherlands.—E. L. C.

POISONOUS HAZARDS AND THEIR EFFECTS: GASES, CHEMICALS, ETC.

HEART MUSCLE CHANGES IN ILLUMINATING GAS POISONING. *Gürich. München. med. Wchnschr., Dec. 18, 1925, vol. 72, pp. 2194–2197.*

In four cases of illuminating gas poisoning, two children and two adults, Gürich describes the pathologic findings, paying particular attention to the cardiac lesions. All patients were unconscious when found and death occurred in one to four days after the gassing. Three out of the four showed bronchopneumonia with hemorrhage especially in the lower lobes. Two cases, including one of the children, aged 10, showed softening of the globus pallidus. The heart showed in three cases an acute myocarditis with hemorrhages of pinhead size, and smaller, usually in the papillary muscles of the left ventricle with streaks of dark red and grayish yellow. The myocardium showed loss of nuclei and of striations and sometimes signs of inflammation: polynuclears, etc., near the hemorrhagic areas.

Gürich says that the heart, like the brain (pallidum and certain cortical layers), shows a special vulnerability—"Organdisposition"—for illuminating gas as evidenced by marked lesions leading to death. He well says, and this should be emphasized, that illuminating gas poisoning and carbon monoxide poisoning are not interchangeable terms. Illuminating gas with its several different components plays quite a different part from carbon monoxide alone. Illuminating gas with its complex make-up is, he says, a parenchymatous tissue poison with a selective action for certain tissues and sometimes unexplainably for certain spots in these tissues. All investigations to explain this selective action have up to the present time failed. Also, individual differences in constitution or predisposition seem to play an important rôle. The author states that it is his opinion that a direct cell poison is brought by the blood stream and that the hemorrhages are secondary and the inflammatory changes are an attempt at repair.—H. S. F.

STUDY OF THE HAZARDS OF PAINT SPRAYING. *E. B. Bricker. Pa. Dept. Labor, Labor and Indust., 1925, vol. 12, no. 9, pp. 9–11.*

With the increasing use of the spray gun for the application of paint, varnish, and other similar substances, and the occasional illnesses of the operators, the Department of Labor and Industry of Pennsylvania drew up regulations concerning its use. These caused so much criticism that a committee was constituted to investigate the matter on a scientific basis.

The investigation included: (1) a survey of working places and equipment, consisting in taking data on the ventilation, apparatus, material used, evidence of spray on the worker's face, the use of a mask, etc.; (2) physical tests, including air temperature, relative humidity, and kata-thermometer anemometric readings; (3) chemical tests, including analysis of the air taken at the head level of the operators, for presence of lead, benzene, and total solvent vapors, with the experimental methods for each test given; and (4) medical and working histories and physical examinations of operators, including blood examinations, records of blood pressure, conditions of the heart and lungs, and analyses of urine and examination of feces for lead in special cases.

The public is urged to offer criticisms and suggestions.—P. D.

NECROSIS OF JAW FROM RADIOACTIVE SUBSTANCES. *A. Lacassagne. Paris méd., Feb. 6, 1926, vol. 59, p. 132.*

DUST HAZARDS AND THEIR EFFECTS

EXPLOSIBILITY OF COAL AND OTHER DUSTS IN A LABORATORY STEEL DUST GALLERY. *V. C. Allison. Abstr. as follows from Colliery Guardian, 1925, vol. 130, pp. 495–496, in Chem. Abstr., Jan. 20, 1926, vol. 20, p. 291.*

A laboratory apparatus for the study of the explosibility of various combustible dusts is described. Data were obtained which show graphically the length of flame of explosive mixtures as a function of the concentration of the dust in the air. The limits of explosibility for mixtures of combustible and inert dust also were studied. With increasing concentration the explosibility of a dust passes through a maximum and then decreases, but this is not true of a mixture of coarse and fine mine dust where the coarse dust is less inflammable and there is only a partial initial combustion. Furthermore one dust may be more explosive than another at low concentrations, and yet the explosibility of the second increases so rapidly at higher concentrations that the order of explosibility of the two dusts is reversed. A third dust may be more explosive than either at low concentrations and less so at higher concentrations. Thus sulphur dust, though more difficult to ignite at low concentrations than starch, sugar, corn, wheat, coal, or aluminium, ranked next to aluminium at higher concentrations. The explosibility comprises in general three factors: the initial explosibility, the rate of increase of explosibility with increase in concentration, and the maximum explosibility. There is no necessary relation between the explosibility and the rate of combustion. The explosibility may further be divided into two factors, the explosibility of the dust *per se* and the explosibility of that part of the dust rendered volatile by the explosion flame. Combustible volatile is not necessary in a dust to render the latter explosive, though it does increase the explosibility. Any dust not already in its most highly oxidized condition may explode if in sufficiently fine condition.

Moisture is about 2.4 times as effective as ash in reducing the explosibility, a ratio which is close to that of their heat capacities. The limiting percentage of inert dust (I) to prevent explosion in a mixture of inert dust and combustible dust can be expressed by the relation $I = 46 + 79$ [volatile/(volatile + fixed C)] $- 1.7\ H_2O - 0.5$ ash $- 1.5\ CO_2 + 2CH_4$, where all components are expressed in percentage. This is accurate to $\pm$ 4 parts of rock dust. If I is below 60, subtract 5; if over 60, add 5. For coarse mixed mine dust in not too large amount, 17 parts of rock dust should be subtracted from I. The term CO_2 can be replaced by $7.5 \times$ O deficiency when an inert gas is used as the explosion preventive.—P. D.

DUST IN INDUSTRY, ITS SIGNIFICANCE TO THE HEALTH OF THE WORKER AND THE RECENT PROGRESS IN THE SPHERE OF ITS PREVENTION AND CONTROL. *K. B. Lehmann, H. Engel, and Wenzel. Beihefte z. Zentralbl. f. Gewerbehyg., 1925, vol. 1, no. 2, pp. 60.*

"Dust in Factories and its Importance for Men," by K. B. Lehmann, comprises the first section of a report to the German Society for Industrial Hygiene, on dust in industry. In the second section Engel considers "Dust Inhalation and Tuberculosis," and in the third, Wenzel deals with "Recent Progress in the Sphere of Dust Prevention and Control."

Lehmann points out that the part played by dust in the occurrence of illness is determined by the amounts, and by the physical and chemical properties of the dust. Table 1 classifies the most important kinds of dust—metal and mineral dust, and animal and vegetable dust—as to shape (pointed, blunt, or round); hardness and softness; and those in which solubility makes shape unimportant. Steel for instance is pointed and hard, zinc oxide blunt edged and moderately hard, and meal round and soft.

A second table gives average milligrams of dust per cubic meter of air varying from 0 in a study, 1.6 in a living room, 22 to 47 in a mill, up to 224 during work in a cement factory. Of nonpoisonous dusts amounts over 100 mg. may be considered very high. Methods of determining dust in air are discussed briefly and the relative unimportance of air borne bacteria is mentioned.

By a series of experiments on animals, Lehmann has ascertained that 90 per cent. of the dust inhaled is retained, and about 60 per cent. is swallowed. Of the dust which enters the lungs a part remains in place, undissolved, and may fill the lung tissue with dust plugs. A second part, if soluble in the body fluids, is dissolved. A third part goes through the alveolar wall into the interstitial tissue, perhaps simply forced in by the air. A fourth part is taken up by phagocytes and migratory cells—the alveolar epithelia take part in this—and transported into the interstitial spaces. Much dust gets into the lymph glands and produces irritation either mechanically or chemically. The result is a more or less marked increase in the connective tissue of the pulmonary alveoli, and the formation of solid cicatricial tissue. The lymph channels may be constricted and obstructed, whole lobules of lungs and even the larger air passages may be partly compressed, and also expanded

through tearing. All this changes the breathing performance of the lungs.

Lehmann indicates the chief differences between tuberculous and dust lung processes, and adds that irritation and tissue injury due to dust give an opportunity for the tubercle bacilli which may already exist in the workers' lungs to develop.

Engel discusses the relation between dust inhalation and pulmonary tuberculosis, which he thinks can be recognized with certainty only with those kinds of dust which quite plainly cause indurative changes in the lung. Progressive changes of this sort frequently turn into pulmonary tuberculosis. Recent research has made it equally certain that the *gradual* formation by dust of indurative changes in the lungs may check the course and spread of an existing tuberculous process and give it the character of a chronic attempt of the lung to contract. This is true of dust containing silica.

According to Engel, the danger of tuberculosis from inhalation of organic dusts is most difficult to determine. The raised tuberculosis mortality observed in occupations involving these dusts may be due to the unfavorable effect of occupational selection. Statistical conclusions concerning this question are only relatively reliable, even if all circumstances favoring the spread of tuberculosis within and without the occupation are carefully borne in mind.

Prior to describing the measures that recent investigation has made possible in combating dust, Wenzel lays down a few general principles of ventilation by means of suction pipes. He indicates in a table the velocity of air which is safe for the worker with various kinds of dust.

Wenzel illustrates the various types of dust elimination with fifteen figures, photographs, and drawings of modern apparatus designed for this purpose by several German firms. Among others he includes an application of the vacuum process, metal surface filters, chiefly moistened with oil, and precipitation of dust by water and by electricity. Progress in controlling dust rests on adaptation of the same more or less combined principles to varying industrial processes and local conditions, and is stimulated by a desire for the recovery of useful dust, the repeated use of purified air or gas, and attempts to reach the least possible expenditure of power, water, and material.—E. S. C.

OCCURRENCE AND PREVENTION OF INDUSTRIAL ACCIDENTS

A Contribution to the Study of the Human Factor in the Causation of Accidents. *E. M. Newbold. Indust. Fatigue Res. Board, Rep. No. 34, pp. 70. H. M. Stationery Office, 1926.*

This report is one of considerable importance and should be carefully weighed by all interested in accident prevention. The study was undertaken in order to submit to the test of more extensive data the tentative deductions arrived at in 1919 by Greenwood and Woods concerning the part played by the human factor in the causation of accidents. The statistical methods pursued are admirable and reflect credit on the author, who has

faced the manifold difficulties of the inquiry with great acumen, even though the result may present a somewhat forbidding aspect to a nonstatistical reader.

Records were collected relating to the distribution of 16,188 ambulance room injuries among a personnel of 6,938 men and 2,024 women employed in a variety of industries. The number of accidents was found to be influenced by a comparatively small number of workers, and the distribution to be far from a chance one. At least part of the distribution was due to a personal tendency to sustain accidents. A table is given from which an estimate can be readily made as to whether the accidents in any department depend mainly on common risks or on personal idiosyncrasy. The hypothesis that the occurrence of one accident makes the occurrence of others more or less likely is rejected in favor of the existence of an initial individual susceptibility. The tendency to accidents was found to diminish with age, even after allowance was made for the factor of experience which naturally increases with age. This decreasing tendency is not necessarily inconsistent, as might at first sight appear, with the known higher accident mortality rates among older workers (pointed out by Collis and Greenwood) since older workers possess a greater "tendency to die" than younger workers. Of interest, too, is the tendency for those sustaining most accidents to suffer most from sickness; apparently underlying the causation of both accidents and sickness there is a common factor—the existence of ill-being. The existence of a personal "tendency to accidents" is supported by finding the same persons sustaining an undue proportion of accidents of all kinds, and at home as well as at the factory. The indications just mentioned held good for both men and women. The deductions drawn point to the practical value of eliminating from risk those with a susceptibility to accident and of avoiding as far as possible a changing personnel of young workers.

Other points remain for study, such as what, if any, relation exists between a tendency to incur minor and major accidents, a subject already receiving attention. The principles underlying accident causation, coming to light from these investigations, undoubtedly apply in ordinary life, and not merely to industrial accidents. They suggest that even a slight accidental occurrence should be accepted as a warning that the recipient is "not quite fit," and so may possess a temporary tendency both to accident and to illness.—E. L. C.

INDUSTRIAL SANITATION: FACTORY CONSTRUCTION, ILLUMINATION, VENTILATION, HEATING, WATER SUPPLY, SEWAGE DISPOSAL

ELEVENTH REPORT OF ADVISORY COMMITTEE ON ATMOSPHERIC POLLUTION: REPORT ON OBSERVATIONS IN THE YEAR ENDING MARCH 31ST, 1925. *H. M. Stationery Office, 1925, pp. 46.*

The eleventh report of the Com-

mittee consists mainly of tabulated data of atmospheric soot and smoke deposition from the forty-eight stations and areas scattered throughout the large manufacturing cities of England and Scotland. The data from the forty-eight deposit stations are being collected by nineteen authorities. All but five of these are in the Midland area with none in Wales and none south of Kingston-on-Thames. The Committee suggests that while large areas are not represented, the Midland area, which suffers most from smoke pollution, is taking a very active interest in the investigation.

Facing page 42 is given a curve showing relation of suspended impurities to wind velocity. By means of some thirty-four points it was found that the curve is determined by a formula

$$I = \frac{0.55}{V} + 0.27$$

where I is concentration in milligrams per cubic meter and V the wind velocity in meters per second. This indicates that the wind effect is primarily one of dilution and that, with increased wind velocity, the smoke particles are carried laterally (and downward) with the wind and not spread upward or in all directions laterally.

It is regrettable that smoke pollution surveys of this magnitude are not made in the United States, particularly in our large industrial centers. The application of data thus collected to vital statistics is so obvious that it needs no comment. We could not do better than copy both the apparatus and the methods used in Great Britain. —P. D.

Good Lighting Proves its Case for Speed and Accuracy. *P. W. Cobb and F. K. Moss. Factory, Dec., 1925, vol. 35, pp. 1000, 1004–1005.*

The conclusions of the writers that an increase in factory production may be expected to result from an improvement of the lighting system in the direction of higher intensities are supported by actual production tests conducted in various types of work. Charts show the influence of the intensity of illumination on the speed of reading, and also the rate of increase of production with increase of illumination.—R. M. T.

Printing Plant Lighting. *Nela Booklet I–1, Nov. 12, 1925.*

New and Better Lamps. *Nela Booklet G-3, Feb. 20, 1926.*

Safe Lighting for Dusty Industries. *Nela Booklet I–2, March 18, 1926. National Lamp Works, Nela Park, Cleveland, Ohio.*

Which Type of Lighting Best Fits my Production Needs? *W. Harrison and R. A. Palmer. Factory, Dec., 1925, vol. 35, pp. 905–908.*

This is a brief discussion of the three general systems of illumination—direct, indirect, and semidirect—with illustrations of the types of lamps used in the different systems.—R. M. T.

A Consideration of the Psychological Aspects of Illumination in Coal Mines. *E. Farmer. Illuminating Eng., Feb., 1926.*

The author thinks that the great contrast between the bright filament of the miners' electric lamp and the black surroundings of the mine causes a persistence of afterimages which inter-

fere with vision and set up retinal fatigue. To obviate this contrast he advocates making the lamp glasses translucent by acting on them with hydrofluoric acid. Lamps fitted with these glasses produced fewer after-images and gave greater visual acuity. Experiments were carried out with large lamps fitted with these glasses and an increased output was the result. In the discussion which followed, Llewellyn stated that although the illumination of the coal mine had been improved there had been a great increase in the number of accidents. Elworthy reported favorably on the use of yellow-tinted glasses.

T. J. Slack criticized the use of low efficiency long life bulbs which saved expense but gave poor illumination. He advocated the use of gas filled bulbs of a higher amperage. The efficiency of the yellow-tinted glasses was due not to the cutting off of the ultraviolet rays—the ordinary lamp glass did this—but to the passage through of those rays in which visibility was greatest. The discussion was continued by several lamp manufacturers who emphasized the importance of maintenance and careful training of lamp men. Mr. Hailwood showed an oil lamp capable of giving 3 candle power.—T. L. L.

INDUSTRIAL SERVICE AND MUTUAL BENEFIT ASSOCIATIONS

MINERS' WELFARE FUND. FOURTH REPORT FOR THE YEAR 1925. *H. M. Stationery Office, 1926, pp. 66.*

The excellent work for improving the social environment of the life of British coal miners carried out through the Miners' Welfare Fund continues. Since this fund was started five years ago, £2,720,000 have been spent, and expenditure is now proceeding practically equal to the income, which is approximately £1,000,000 per annum. The report sets out progress made during the year just ended. A new side of the work has been the establishment of an expert advisory branch through which local committees all over the coal fields can obtain help and advice, which goes far to insure that the money spent is spent economically, particularly with regard to the layout of recreation grounds and the design of buildings. More and more the need for district welfare organizers is coming to the front. Indeed the whole activities of the fund are becoming steadily more organized on scientific and businesslike lines. The fund is used as gifts for carrying out approved schemes, and trustees have to be appointed and trust deeds carefully drafted and executed; these matters have called for close attention. Recreation continues to bulk largely in the schemes financed, and interest attaches to the facilities provided for children and young people in the mining areas in the layout of schemes. An excellent description is given of some of the larger schemes completed during the year. An indication of variety may be quoted in the construction of a suspension bridge to bring into use land otherwise not accessible. Convalescent homes are financed and their management has called for close supervision. A little more has been done for pithead baths,

but on British coal fields this line of needed accommodation is still very backward. A comprehensive scheme of education is gradually being worked out, assisted mainly from the fund. In connection with the educational program, certain proposals are receiving attention for establishing a national scholarship scheme for which both the working miners and their sons or daughters may be eligible. A portion of the fund is devoted to research into matters of safety and health on the coal fields; much good work has already been done in this direction including the establishment of a new experimental station and laboratories. The report contains several well-illustrated appendices which record a few striking instances of what has been done, not the least interesting of which are photographs showing land before and after conversion for recreational purposes, and also mining schools set on foot. The whole concludes with an index, not only to the present report, but to the three previous ones; this will prove of great value.—E. L. C.

Employee Magazines in the United States. *Nat. Indust. Conference Board, Inc., 1925, pp. 86.*

This is a study of the function of an employee magazine and of the factors necessary for its success. An analysis is made of the size and contents of employee magazines and of the results accomplished, and suggestions are given for increasing their effectiveness. Notes and comments by editors and company executives are included. The appendix contains a list of employee magazines published in the United States.—M. C. S.

Vacation Policies in Manufacturing Industries. *N. Y. State Dept. Labor, Special Bull. No. 138, July, 1925, pp. 23.*

INDUSTRIAL HEALTH LEGISLATION: COURT DECISIONS: WORKMEN'S COMPENSATION AND INSURANCE

Labor Legislation of 1925. *Am. Labor Legis. Rev., Dec., 1925, vol. 15, pp. 322–357.*

This summary of the labor legislation enacted in 1925 is presented under two headings: (1) analysis by subjects and by states; and (2) topical index by states. Of particular interest to our readers are the sections on hours; safety and health; and workmen's compensation.—M. C. S.

Labor Law of Tamaulipas, Mexico. *U. S. Month. Labor Rev., Nov., 1925, vol. 21, pp. 1113–1120.*

The new labor law of the state of Tamaulipas, which became effective on June 13, 1925, establishes a maximum eight-hour working day; seven hours is the maximum for night work, and seven and one-half hours for working periods including both day and night work. The maximum day for women and minors over 12 and under 16 years of age is six hours, except in domestic service and work which does not require the constant exercise of physical force. The work of children under 12 years shall not be the subject of contract.

The employment of women and children under 16 years of age in

dangerous or unhealthful occupations and in night manual work is forbidden. Women and minors who do work equal to men shall receive the same wages. During the three months before childbirth women will not be allowed to perform any physical work which requires considerable effort; during the month following childbirth they must have a complete rest, retaining their positions, their contractual rights, and their entire wages. During the period of lactation they shall be allowed two extra rest periods a day, one-half hour each, during which they may nurse their children.

Heads of establishments employing 100 or more workers must furnish sanitary and comfortable dwellings for their workers, for which they may charge annual rents not exceeding 6 per cent. of the assessed value of the property. The requirements as to sanitation and health must be complied with and adequate measures adopted to prevent accidents in the use of machines and other instruments. In mines and insanitary regions all precautions must be taken to prevent the spread of infectious diseases. First aid treatment and necessary medicines must be provided in case of accident to the workers.

Other sections of the law provide for compensation benefits, accident reporting, right of organization, conciliation boards, etc.—M. C. S.

General Problems of Social Insurance. *Internat. Labour Office, Studies and Rep., Series M (Social Insurance) No. 1, 1925, pp. xxviii, 136.*

This study deals with the different conceptions on which social insurance systems may be founded and indicates the main problems (scope, benefits, distribution of cost, and administration) and the solutions adopted in the various countries. Particular attention is given to the problem of the unification of social insurance.

Compensation for Industrial Accidents. Comparative Analysis of National Laws. *Internat. Labour Office, Studies and Rep., Series M (Social Insurance) No. 2, 1925, pp. 655.*

This monograph deals with compensation legislation existing at the end of 1924 in all countries except the United States and Mexico (to be treated in a separate volume), and analyzes the laws on the following plan: (1) persons and industries subject to laws; (2) risks covered; (3) compensation; (4) security of payment and insurance; (5) settlement of disputes; and (6) position of foreign workers. Nine tables present in schematic form the provisions of the legislation dealt with in (1), (2), (3), and (5). An appendix contains a list of legal texts used in the preparation of the report.

Compensation for Occupational Diseases. Comparative Analysis of National Legislations. *Internat. Labour Office, Studies and Rep., Series M (Social Insurance) No. 3, 1925, pp. 76.*

This monograph deals with occupational diseases, their definition and characteristics, and the modes of providing compensation for them. The study is completed by an analysis of those provisions of national laws which refer especially to occupational diseases.

COURT DECISIONS ON WORKMEN'S COMPENSATION LAW, JANUARY–DECEMBER, 1925: ALL SUBJECTS. *N. Y. State Dept. Labor, Special Bull. No. 140, 1925, pp. 267.*

COMPLETE THE CIRCLE OF COMPENSATION. *J. B. Andrews. Am. Labor Legis. Rev., Dec., 1925, vol. 15, pp. 285–288.*

The author urges a federal accident compensation law to cover harbor workers who are denied the protection of state compensation laws because they are connected with interstate commerce.—M. C. S.

STATE LAWS NOW NEEDED TO COMPENSATE ALL OCCUPATIONAL DISEASES. *Am. Labor Legis. Rev., Dec., 1925, vol. 15, pp. 316–318.*

This is an argument in favor of extending all state workmen's compensation laws to protect all wage-earners and their dependents against all diseases arising out of their employment. It is maintained that the most satisfactory results are obtained in those states where all occupational injuries, whether or not "by accident," are included in the law.—M. C. S.

OCCUPATIONAL DISEASES SHOULD RANK WITH INDUSTRIAL ACCIDENTS. *W. Hanauer. Med. Klin., Dec. 4, 1925, vol. 21, p. 1864.*

SO-CALLED TRAUMATIC NEUROSES. *E. Stier. Abstr. as follows from Deutsch. med. Wchnschr., Dec. 11, 1925, vol. 51, p. 2062 (conclusion), in Jour. Am. Med. Assn., Jan. 30, 1926, vol. 86, p. 383.*

Stier examined fifty telephone operators who were receiving a pension or yearly allowance for traumatic neurosis due to alleged injuries by the telephone current. His advice was to discontinue every allowance—and forty-seven of them submitted to this without any attempts to modify the decision to this effect. It is interesting to draw a parallel between the sequels of injury in insured persons and in those who cannot derive any advantage from the traumatism. A strict and expert examination of such individuals, and especially of the shell shock cases who want to keep on drawing advantage from it even after the war, together with fair (not lenient) court decisions, not only realizes great savings of public and private funds but also raises the level of public morals.—K. R. D.

PSYCHOLOGY OF COMPENSATION NEUROSIS. *A. Sweeney. Minnesota Med., Aug., 1925, vol. 8, pp. 489–492.*

Two emotions early possess the victim of accidents, especially railroad accidents: fear, and resentment against the negligence which allowed the accident to happen. Through the sympathy of friends and doctors these emotions become accompanied by certain physical symptoms, which produce a condition of apprehension, leading to thoughts about compensation. Worry and self-analysis prolong the condition, and the mental state, influenced consciously or unconsciously by cupidity, becomes stationary, no effort being made by the patient to arouse himself from his morbid, emotional condition. The delays of the law in connection with the now increasingly desired compensation induce the patient to keep up the sickness, so that relief comes only with

the granting of compensation. The attitude on the part of the physicians examining such cases should recognize the fact that man is not merely a physical being but a mental and emotional animal as well, and that these symptoms should be met with an optimistic rather than with a pessimistic attitude as to recovery.—B. L. G.

PROPOSED LEGISLATION ON MEDICAL PROCEDURE IN CONNECTION WITH WORKMEN'S COMPENSATION. *Indust. Doctor, Jan., 1926, vol. 4, pp. 10–17.*

On the approval of a special committee of the New York State Medical Society studying the Workmen's Compensation Law, an Act to amend the Law was put before the New York State Legislature. The amendment is known as Article 4-A and clearly sets forth the duties of employer, medical advisers, and examining physicians to an injured employee. The complete legal procedure regarding an injured employee is clearly outlined.—B. L. G.

THE PHYSICIAN AS A WITNESS BEFORE INDUSTRIAL COMMISSIONS. *P. B. Magnuson. Nation's Health, Jan., 1926, vol. 8, pp. 30–31, 72.*

A doctor appearing as witness before industrial commissions should be, but unfortunately usually is not, strictly impartial. It is easy for one inexperienced in industrial cases to be unconsciously influenced by the opinion of those who employ him, especially in the matter of returning an injured man to work, when he needs light work but is incapable at first of keeping up the record of production which his foreman desires. It has been the practice of the author if a patient was dissatisfied with his opinion to have him choose one of several well-qualified physicians and obtain his opinion and treatment at the expense of the company. Industrial surgeons should have special training to obviate some of the years of experience that are necessary before they can become expert in this line.—E. S. C.

SOME MEDICAL ASPECTS OF WORKERS' COMPENSATION INSURANCE. *N. C. K. Lane. Med. Jour. Australia, Jan. 2, 1926, vol. 1, pp. 1–7.*

This article opens with a statement of the medical procedure in dealing with a claim for compensation in Australia. Apparently procedure does not differ in principle from that of other countries, and the final board of appeal is *not* composed of medical men. Curious mistakes result in consequence. In Queensland a definite monetary value is placed on each part of the body; and in case of injury a claim is assessed accordingly, quite apart from the amount of disability, so that a typist and a signalman receive the same compensation for loss of an index finger—which is absurd. Malingering is not frequent in Queensland; only 9 per cent. of all claims last more than eight weeks, and in this small percentage are included serious fractures, hernia, lead poisoning, and miners' phthisis cases; there is little room for the malingerer with a "sprained back." The author considers that "traumatic hernia" is a real thing and also holds that it may come into existence without the sudden pain and nausea usually described. Heart strain due to exertion is very rare for a healthy heart; it is

most usually associated with a previously diseased organ; such cases rarely recover sufficiently to return to their former occupations. Genuine cases of "sprained back" are due to tearing of fibers of the back muscles, and the muscles on both sides are sometimes so injured. These cases call for careful treatment by massage and rest with the patient lying flat. A plea is made for more careful treatment of fractures, particularly for Colles' and Pott's fractures. Under skilful treatment such injuries seldom cause loss of function. Miners' phthisis is calling for consideration; the patients show few characteristic signs; X-ray examination is practically essential to sound diagnosis. Such examinations of all miners exposed to risk should be made periodically. In Queensland lead poisoning is responsible for much disability. The occupation of a claimant may help in diagnosis; in doubtful cases, a blood examination may be the determining factor.—E. L. C.

INDUSTRIAL MORTALITY AND MORBIDITY STATISTICS

SICKNESS AMONG INDUSTRIAL EMPLOYEES. INCIDENCE AND DURATION OF DISABILITIES FROM IMPORTANT CAUSES LASTING LONGER THAN ONE WEEK AMONG 133,000 PERSONS IN INDUSTRY IN 1924, AND A SUMMARY OF THE EXPERIENCE FOR 1920–1924. *U. S. Pub. Health Rep., Jan. 22, 1926, vol. 41, pp. 113–131.*

Influenza and grip was not so prevalent in 1924 as in either 1922 or 1923, but still remained the leading cause of disability lasting eight days or longer. Nonindustrial accidents were the second most frequent cause in each of the last three years.

Respiratory diseases accounted for 47 per cent. of all the cases of sickness reported during the last five years.

Less disability was reported in January, February, and March, 1924, than in the same months of each of the four preceding years.

The frequency of disabilities of eight days or longer was 44 per cent. higher among female than among male industrial employees for diseases common to both.

There was considerably more sickness reported among men employed in public utilities than in iron and steel manufacturing and in a group of miscellaneous industries. The frequency of certain diseases varied according to industry. Among steel workers there was a higher rate for certain epidemic and infectious diseases such as smallpox, typhoid fever, and malaria, and the pneumonia rate was well above that for the other industries studied.

Sickness severity rates for 1924 under three different benefit periods indicate that diseases of the nervous system, of the circulatory system, and of the genito-urinary system are much more important from the standpoint of the amount of time lost than from the standpoint of their frequency. Influenza and grip is important from both points of view. There appeared to be no general tendency toward longer incapacitation under longer benefit periods.—M. C. S.

ABSTRACT OF THE LITERATURE OF INDUSTRIAL HYGIENE

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GENERAL

INDUSTRIAL MEDICAL SERVICE FACES BARRIERS TO PROGRESS. *W. J. McConnell. Nation's Health, March, 1926, vol. 8, pp. 168–169.*

The author lists five factors which in his opinion contribute to the failure of industrial medical services: (1) the incompetent physician—an industrial position is frequently used by a young physician to tide him over till he establishes a practice; (2) the omission of industrial instruction in medical schools; (3) the unsympathetic public health officer; (4) the careless plant manager who fails to utilize the medical department to its fullest extent, or to give proper authority and equipment to the physician; and (5) failure of small plants to organize joint industrial medical services.—E. S. C.

MEDICAL SERVICE PROVES ITS VALUE TO INDUSTRIAL PLANTS. *E. R. Hayhurst. Nation's Health, April, 1926, vol. 8, pp. 246–248.*

A physician undertaking industrial work should acquaint himself at once with the health standards commonly

accepted for the various hazardous conditions of work, for physical examinations, for the set-up of staff organizations, dispensary equipment, etc. He should be given an opportunity to sit in on all questions of heating, lighting, ventilation, the use of poisons, strikes, and, in fact, practically all instances of human unproductiveness. In this way his work may be preventive. "Where medical services cost no more than $2.00 or $3.00 per capita per year the adequacy may be considered a 'blind' in most instances; $10.00 per year is palliative; $25.00 per year will usually provide a minimum but complete industrial medical service."—E. S. C.

Rôle of Medical Services in Factory. *W. F. Dearden. Jour. State Med., Jan., 1926, vol. 34, p. 26.*

SYSTEMIC OCCUPATIONAL DISEASES: OCCURRENCE, TREATMENT, AND PREVENTION

Report of the Departmental Committee Appointed to Consider Evidence as to the Occurrence of Epitheliomatous Ulceration among Mule Spinners. *Home Office, 1926. H. M. Stationery Office.*

Since Southam and Wilson published their findings in 1922 that out of 141 cases of epithelioma of the scrotum sixty-nine cases occurred in mule spinners, Henry and his committee have traced 539 cases. In France, Germany, Russia, Poland, and America these cases are practically unknown or unrecognized. Incidentally one of the tables (No. III) shows that at the ages of 25 to 35 the general mortality in cotton spinners is 14 times as great as in the general population; between the ages 45 to 55, 60 times as great; and between 55 to 75, 100 times as great.

There is no evidence showing that women are affected with epithelioma from this occupation. In men the average duration of employment, before evidence of tumor formation arises, is forty years. The disease may also first arise years after a man has left employment. The growths form on the scrotum in 85.5 per cent. and on other parts of the skin in 16.5 per cent. The reporters, however, think this last figure is underestimated.

The recommendations made by this departmental committee are: an experimental inquiry to find out which oils are innocuous and at the same time suitable as lubricants; the development of a "non-splash" type of spindle bearing, particularly for new mules; the prevention of oil splash from mules by some form of guard; periodic medical examination of the workers; and the distribution of leaflets impressing upon the workers the importance of cleanliness and the necessity of avoiding delay in obtaining early treatment.—R. P. W.

POISONOUS HAZARDS AND THEIR EFFECTS: GASES, CHEMICALS, ETC.

Benzol Poisoning and its Prevention. *H. C. Davis. Safety Engin., Jan., 1926, vol. 51, pp. 49–54.*

The effects of chronic benzol poison-

ing are briefly summarized. The industries where benzol is used, chiefly as a solvent, are listed. Special mention is made of a can factory where several cases of poisoning have occurred during the past few years, two of which proved fatal. There is a short summary of remedies for conditions in the can making plants, with some suggestions that have brought about better conditions in this plant.—R. M. T.

CONTINUOUS CARBON MONOXIDE RECORDER IN THE LIBERTY TUNNELS. *A. C. Fieldner, S. H. Katz, and E. G. Meiter. Abstr. as follows from Engin. News-Rec., 1925, vol. 95, pp. 423–424, in Chem. Abstr., Jan. 20, 1926, vol. 20, p. 255.*

A carbon monoxide recorder which has been successfully employed in controlling ventilation in the Liberty tunnels, Pittsburgh, for ten months is described and illustrated. The principle involved is the measurement by thermocouples of the increased temperature of gas when carbon monoxide and oxygen react in the presence of a catalyst, the thermo-electric effects being recorded by means of a potentiometer which is sensitive to 1 to 2 parts per million. Four parts of carbon monoxide per 10,000 parts of air have been determined to be the maximum concentration to which human beings may be exposed continuously for one hour without noticeable effect; or, if concentration is increased from zero uniformly for one hour, maximum tolerable concentration is 6 parts per 10,000, averaging 3 parts for the hour. —P. D.

DEVELOPMENT AND CHARACTERISTICS OF A CARBON MONOXIDE RECORDER. *S. H. Katz, D. A. Reynolds, H. W. Frevert, and J. J. Bloomfield. Jour. Am. Soc. Heating and Ventil. Eng., May, 1926, vol. 32, pp. 349–374.*

As the result of the work of Henderson and his colleagues (see THIS JOUR., 1921–1922, vol. 3, p. 79) it was established that 4 parts of carbon monoxide per 10,000 parts of air was the maximum concentration to which a person may be exposed continuously without noticeable effects. This figure has been adopted in connection with the Holland vehicular tunnels under the Hudson River and the Liberty tunnels at Pittsburgh. The ventilation in both is adequate to keep the carbon monoxide below this limit of 4 parts per 10,000 at all times. As safety devices, carbon monoxide recorders are to be used in both these tunnels. The authors describe in very complete detail the development, constructional and operating characteristics of automatic recorders which are rapidly sensitive to slight changes in carbon monoxide concentration and are capable of recording accurately the presence of much less than 1 part of carbon monoxide per 10,000.

The principle of the apparatus is the measurement of the heat of the oxidation of carbon monoxide to carbon dioxide. The air containing carbon monoxide passes through hopcalite which acts as an oxidizing catalyst and converts carbon monoxide to carbon dioxide. The heat liberated is measured by a thermopile connected to a Leeds and Northrup recording potentiometer.

The optimum rate of air flow through the catalyst, the effect of other oxidizable gases like hydrogen, the optimum amount and depth of hop-

calite, and other like details are given clearly and completely.

One of these recorders has been subjected to six months' continuous use in the Liberty tunnels and shows no signs of deterioration in sensitivity. A like period of practical testing at the United States Bureau of Mines laboratories gave equally satisfactory results.—P. D.

DETERMINATION OF LEAD IN ORGANIC SUBSTANCES, ESPECIALLY FECES AND URINE. *V. Froboese. Arch. f. Hyg., 1926, vol. 96, pp. 289–293.*

Feces are ashed in nickel dishes with the aid of nitrates. Lead is precipitated from urine with the earthy phosphates and the final estimation of lead made by precipitation as chromate and titration with dilute sodium thiosulphate solution. (The six analyses cited indicate an accuracy much less than has previously been attained with the modified chromate method (see THIS JOUR., 1922–1923, vol. 4, pp. 9–20)).—L. T. F.

CLINICAL OBSERVATIONS ON PLUMBISM. *J. G. Gelman. Arch. f. Hyg., 1926, vol. 96, pp. 301–310.*

The toxic action of lead is distributed among a number of organs which it affects in varying degrees. Its most pronounced action is on the blood, for anemia is the most frequent and the earliest symptom of lead poisoning. The nervous system is only slightly less affected and lead action is frequently manifested in acute neurospastic crises (lead colic). Injury to the vascular system is apparent in endarteritis and hemorrhage. Hypertony is no more frequent in lead workers than in those in other occupations. Lead also injures the cells of the parenchymatous organs (liver, kidney, heart muscle, etc.) and leads to trophic alteration of the heart muscle. The cardinal symptoms of lead poisoning are not constant, however; they appear merely as incidents in the chain of pathologic changes which are associated with lead poisoning.—L. T. F.

THE METALLURGY OF QUICKSILVER. *L. H. Duschak and C. N. Schuette. U. S. Bur. Mines, Bull. 222, 1925, pp. 173.*

This is a monograph on the entire metallurgy of quicksilver ores with particular reference to American practice. "Health Hazards in the Extraction of Quicksilver" (ten pages) is a copy of a paper (1922) by R. R. Sayers (see THIS JOUR., 1922–1923, vol. 4, Abstr. Section, p. 123).—P. D.

DUST HAZARDS AND THEIR EFFECTS

A NEW METHOD FOR MEASURING THE DUST IN AIR AND INDUSTRIAL GASES. *W. Allner. Abstr. as follows from Farbe u. Lacke, 1925, p. 451, in Chem. Abstr., Jan. 20, 1926, vol. 20, p. 160.*

The dust collector recommended consists of a cylinder provided with suitable filter cloths which are removable for weighing. Correct determination of dust content in gas streams is possible only when the pressure in the sampling tube is identical with that in the main stream.—P. D.

ANNUAL REPORT FOR THE YEAR 1925, STANDING COMMITTEE ON DUST SAMPLING. *Transvaal Chamber of Mines, Executive Circ. No. 6/26, Feb., 1926.*

The results of two surveys, Nos. 50 and 51, are reported. In all, 311 visits were paid to mines and 2,389 samples collected, giving an average of 0.9 mg. of dust per cubic meter. This figure represents "only the arithmetical average of the samples taken, and must not be taken as representing the average amount of dust in mine air. The number of samples averaged, however, is probably sufficiently great to ensure that the average is a good indication of the general dust conditions of the mine air."

During the year 25,347 dust samples were taken by the mine dust inspectors, giving an average of 1.1 mg. per cubic meter. Also "14219 Konimeter spots were counted with dark ground illumination after acid treatment." In all, the results show a steady improvement in conditions from year to year.

Owing to numerous tables contained, the report is unsuited to abstracting. The foregoing, however, is sufficient to show the significant progress in dust elimination achieved and the conditions maintained today in the South African mines. Perhaps some day, we, in the United States, may achieve as good results.—P. D.

TESTS AND CHARACTERISTICS OF DUST RESPIRATORS. *S. H. Katz, G. W. Smith, and E. G. Meiter. U. S. Bur. Mines, Rep. Investigations, Serial No. 2745, April, 1926, pp. 8.*

This report is a condensed summary of work to be published later as a Bureau of Mines Technical Paper.

The various respirators tested were all of the filter type having different kinds of filtering materials. Most of the tests were on the filters only—not on the complete respirators. The test suspensions were tobacco smoke (particles about 0.27 micron) and a special silica dust (particles about 1 micron). Filtering efficiencies were determined by the United States Bureau of Mines apparatus in which the Tyndall effect of air escaping from the filter is matched against a stream of arbitrarily determined Tyndall intensity.

The authors give the conclusions of their complete investigation with two tables of practical test data. The brief bulletin here published contains a concise statement of interest to anyone concerned in the practical aspects of respirators.—P. D.

OCCUPATIONAL INFECTIOUS DISEASES: OCCURRENCE, TREATMENT, AND PREVENTION

A NEW OCCUPATIONAL BURSA ("DUSTMAN'S" BURSA). *W. M. Eccles. Brit. Med. Jour., Feb. 20, 1926, vol. 1, p. 323.*

The case of a dustman is reported who developed an adventitious bursa on the left leg below the knee. When at work he had to mount a ladder at the side of his dust cart and then lean with the upper third of his tibia against one of the higher rungs, so as to get a purchase to enable him to tilt the dust

from the receptacle into the cart. The note is illustrated.—E. L. C.

RAILWAY PIONEERS IN MALARIA CONTROL IN SOUTH. *H. W. Van Hovenberg. Nation's Health, Feb., 1926, vol. 8, pp. 88–89, 138.*

The St. Louis Southwestern Railway Lines discovered ten years ago that fully 10 per cent. of its employees received hospital treatment for malaria each year, and that a larger number of men continued to work while physically unfit, or procured treatment for "chills and fever" from local surgeons. A malaria control program—consisting in the education of employees in the rôle of the malaria mosquito; screening of cabooses, camp cars, section houses, stations, and office buildings; drainage and oiling of the breeding places of mosquitoes; the liberal use of fish which eat mosquito larvae; and the use of quinine—has reduced the number of men from the section forces receiving hospital treatment from an annual average of 258 in the years 1913 to 1916 to seven in 1925. —E. S. C.

THE RELATION OF ANTHRACOSIS TO TUBERCULOSIS AND PNEUMONIA. *W. P. Nolan. Med. Times, Feb., 1926, vol. 54, pp. 29–32.*

From prolonged observation in smoky districts and mining regions the author concludes that anthracosis increases the incidence, severity, and mortality from pneumonia, but decreases the incidence, severity, and mortality from tuberculosis; the untoward effect of preexistent anthracosis on pneumonia is vastly outweighed by the salutary effect on both the incidence and course of pulmonary tuberculosis.—M. C. S.

OCCUPATIONAL AFFECTIONS OF THE SKIN AND SPECIAL SENSES

RIEHL'S MELANOSIS IN A LOCOMOTIVE DRIVER. *Lortat-Jacob, Legrain, and Flezet. Bull. Soc. franç. de dermat. et syph., Jan., 1926, pp. 20–24.*

A locomotive driver came under observation with melanosis. So far as he knew he had followed, without any untoward effects, the identical work for about five years. He noticed a few months previously that the skin of his face and neck was getting darker: in some parts almost mahogany colored. Otherwise he felt in his usual health. These writers discovered that there was also increased staining of the folds of the axillae, elbows, and groins. The coloration was preceded by a redness, not very marked. Then followed a patchy reticulated browning, surrounded by a violet zone. As the melanosis faded, the parts affected became slightly atrophic. This was confirmed clinically, as well as histologically.

The writers note the close similarity between oil, tar, and pitch melanosis. Subsequent speakers discussed the relationship between these external causes of pigmentation and certain disorders of internal glands which lead to this symptom.—R. P. W.

A STUDY OF SOME ASPECTS OF MINERS' NYSTAGMUS. *G. H. Pooley.*

Lancet, April 10, 1926, vol. 1, pp. 750–754.

The author gives a condensed summary of the work previously done on this disease, quoting particularly Simeon Snell and Sir Josiah Court, with references to the studies made by Dransart and Romiée. Observations made by more recent workers are also dealt with. Certain facts are held to be of common agreement. Mr. Pooley himself favors nystagmus being a compensatory effort to overcome the effect of working in defective light. He then describes certain experiments made by himself which show how, as the intensity of light diminishes, the macula becomes less sensitive than the area at its periphery and the adjacent part of the retina. When the illumination is below 0.002 candle power, an illumination comparable with that of miners working with safety lamps, difficulty is experienced in maintaining strict fixation of vision. "The eye tends to travel in a small area all round the object it is fixing. This becomes exaggerated into something very like a vertical and even a rotatory nystagmus at times." The experiments here reported are stated to be still in progress. —E. L. C.

MINERS' NYSTAGMUS. *F. Fergus. Glasgow Med. Jour., March, 1926, pp. 161–181.*

The various theories advanced to explain the occurrence of miners' nystagmus are considered critically, and all, in the opinion of the author, are found wanting. The suggestion is made that the disease is chiefly one of the nervous system, but no theory is advanced to account for it. Instances are quoted of the breaking out of nystagmus coincident with the installation of electric lamps, but the fact that badly cared for electric lamps may give less illumination than oil lamps seems quite unknown to the writer, who, on this evidence alone, condemns the theory that the disease is associated with defective illumination.—E. L. C.

OCCURRENCE AND PREVENTION OF INDUSTRIAL ACCIDENTS

INDUSTRIAL SAFETY. *Ann. Am. Acad. Pol. Sc., Jan., 1926, vol. 123, pp. 1–224.*

This issue contains forty-two articles on various phases of industrial safety: the need for safety in industry; organized accident prevention movement; safety code development and enforcement; safety in specific industries; accident prevention for certain hazards; educating the worker in safety; and the relation of safety compensation and rehabilitation. It fills a need (1) for those who have been a part of the safety movement, by showing the progress that has been made in reducing industrial accidents and by indicating paths to be taken which will bring further results; (2) for employers who have held back from safety work, by showing them practical methods which have brought proved results and by pointing out that accident prevention pays; and (3) for those who have but little knowledge of industrial safety, by providing the groundwork and the

superstructure necessary to an aroused interest.

PERMISSIBLE EXPLOSIVES, MINING EQUIPMENT, AND RESCUE APPARATUS APPROVED PRIOR TO JANUARY 1, 1925. *J. E. Crawshaw, L. C. Ilsley, D. J. Parker, and A. C. Fieldner. U. S. Bur. Mines, Tech. Paper 376, 1925, pp. 35.*

INDUSTRIAL PHYSIOLOGY: NUTRITION, METABOLISM, FATIGUE, ETC.

THE RESULTS OF THE ADOPTION OF THE EIGHT-HOUR DAY: II. THE EIGHT-HOUR DAY AND THE HUMAN FACTOR IN PRODUCTION. *E. Milhaud. Internat. Labour Rev., Feb., 1926, vol. 13, pp. 175–210.*

A previous article by the same author discussed the effect of the eight-hour day on the technical conditions of production; he now takes up its influence on the human factor. Certain factors since the war have interfered with evidence on the point, such as underfeeding, war strain, post-war depression, fluctuations in wages, and abnormal technical conditions. Some of these influences have led to fall in output, which must not be ascribed to reduction in hours. Evidence is marshaled to show that health and frequency of accidents have both been advantageously affected by the shortened hours, and that with less fatigue, tendency to alcoholism has diminished. Professor Milhaud quotes extensively from English publications, particularly those of the Health of Munition Workers Committee. Slow work is held to be a tendency of human nature to defend itself against the harmful effect of long hours by an instinctive reduction of energy; while reduction of hours, by improving health, is automatically accompanied by an increase in working capacity; the will to work revives when hours are reduced. There has been an intensification of work due to reduction in lost time and increase of output per unit of time worked. Reduction in lost time may indeed result in more actual hours being worked, when the number of possible hours is reduced. Increase of output does not follow immediately but gradually, and periods from four months to twelve months, according to the process carried out, may pass before the full result is manifest.

The author considers that his inquiry is on the whole encouraging, and shows that the reform of the eight-hour day has brought moral, social, and intellectual progress, has promoted technical progress, and has led to more rational and economic use of the human agent in industry. Throughout the article evidence has been gathered from many countries and from many inquiries to shed light on the matter under consideration. It is a useful summary which repays perusal.—E. L. C.

HAZARDS OF COMPRESSED AIR, DIMINISHED PRESSURE, GENERATION AND USE OF ELECTRICITY, AND ELECTRICAL WELDING

NOTES ON THE "LAURENTIC" SALVAGE OPERATIONS AND THE PREVENTION OF COMPRESSED AIR ILLNESS. *G. C. C. Damant. Jour. Hyg., Feb., 1926, vol. 25, pp. 26–49.*

This article is one descriptive of many adventures which took place in recovering bullion from the "Laurentic," which was sunk in 1917 off the Irish coast. The wreck was located at a depth of 120 feet. The gold, valued at £5,000,000, was in the form of 3,211 bars, of which finally 3,186 were recovered by diving operations. The procedure adopted was as follows: The diver was limited to about thirty minutes at the bottom and to thirty minutes more decompressing in mid-water. At the end of thirty minutes at the bottom, he rose to 30 feet below the surface where he remained for five minutes violently exercising his limbs to increase the circulation and promote the escape of nitrogen from his tissues; then he ascended another 10 feet and spent a further ten minutes at the new level; then he ascended to 10 feet below the surface where he spent fifteen minutes. Finally he got inboard some sixty-five to seventy minutes after commencing his dive. When any symptoms of compressed air illness became manifest, he was placed in a recompression chamber until they had passed off. Operations were prolonged and lasted over nearly seven years, but the cost amounted to only some 2 to 3 per cent. of the value salved. During the whole of the operations there were no accidents to life or limb, although several of the incidents described came near to disaster and were avoided only through the exercise of presence of mind.—E. L. C.

HEAT, COLD, AND HUMIDITY

WORK TESTS CONDUCTED IN ATMOSPHERES OF LOW TEMPERATURES IN STILL AND MOVING AIR. *W. J. McConnell and C. P. Yaglou. Jour. Am. Soc. Heating and Ventil. Eng., May, 1926, vol. 32, pp. 375–386.*

During the last two years the United States Bureau of Mines in co-operation with the Research Laboratory of the American Society of Heating and Ventilating Engineers and the United States Public Health Service has been conducting laboratory experiments for the purpose of studying the ability of men to perform muscular work in different atmospheres of temperature, humidity, and air movement. The work consisted in raising a weight of 40 pounds through a distance of 5 feet, seventy-five times in five minutes, with alternate five-minute rest periods. The men were stripped to the waist in all experiments.

A progress report on the high temperature work appeared last year (*Tr. Am. Soc. Heating and Ventil. Eng.*,

1925, vol. 31, p. 101, see THIS JOUR., 1925, vol. 7, Abstr. Section, p. 145). The present report contains additional data obtained in low temperatures and combines the results of the entire investigation. Under the conditions of these experiments men can work efficiently and comfortably in still atmospheres of any temperature between 60° and 75°F. dry bulb and with ordinary humidities. The most probable optimum appears to be about 70° dry bulb and 45 per cent. relative humidity. From 43° to 85° practically the same amount of work was accomplished by the subjects, and the body was found capable of adjusting itself to the temperature of the environment. Some discomfort was experienced, however, near these two extreme regions in temperature, the lower being decidedly cold and the upper warm, for comfort. Above 85° significant physiologic reactions were manifested and were accompanied by a fall in output and general discomfort. It was observed that in air saturated with moisture at body temperature, the men accomplished only one-fourth of the work done in comfortable temperatures, while the body temperature rose at the rate of about 4°F. per hour and the pulse frequency increased at the rate of about 100 beats per minute per hour.

The authors emphasize the importance of air movement and its limitations when the temperature of the environment approaches the temperature of the body.—C. P. Y.

INDUSTRIAL SANITATION: FACTORY CONSTRUCTION, ILLUMINATION, VENTILATION, HEATING, WATER SUPPLY, SEWAGE DISPOSAL

STUDIES IN NATURAL ILLUMINATION IN SCHOOL ROOMS. PARTS I AND II. *T. Clark and A. F. Beal. U. S. Pub. Health Bull. No. 159, Jan., 1926, pp. 57.*

In Part I, on the "General Consideration of Daylight Illumination," three sets of factors are given as determining the adequacy of the natural lighting of classrooms:

. . . . (1) Astronomical and meteorological, (2) physical, and (3) physiological. The astronomical and meteorological factors are the source and certain conditions which may modify the light received from the source. These are the factors which are beyond the control of man, and include such items as the varying positions of the sun in the sky with the time of day and the season, and the effects of clouds and other meteorological conditions. The physical factors are those within the control of man, and include the items which govern the admission and utilization of light in buildings. They are the details of the structure and shape of a building and the obstructions to the admission of the light, such as adjacent buildings and trees. The physiological factors relate to the structure of the eye and its power of adaptation.

With regard to the cost of natural lighting the following statement is made:

Even though the provisions for adequate daylighting should entail a cost in excess of artificial lighting, the adoption of artificial light as the sole source of illumination for schools, as has been advocated by some, and the failure to provide adequate natural illumination, would probably be a false economy.

Part II gives the results of an illumination study made at Hagerstown, Md., and is summarized as follows:

The following conclusions are based upon the study of about 45,000 observations of daylight illumination on 24 selected desks in four classrooms, about 3,800 observations of outside illumination in an open lot, and about 3,800 observations of the brightness of the sky, these covering the school day for an entire school year:

1. The inside illumination shows a seasonal minimum in winter the same as the outside illumination.

2. The diurnal change of the inside illumination is largely controlled by the direction of the exposure of the room in which the observations are made.

3. The inside illumination, apparently, is influenced more by the sky brightness than by the outside illumination.

4. From the desks in the row farthest from the windows the illumination was below the accepted standard of 5-foot candles much too frequently to be ignored.

5. Artificial lighting should be provided, at least for the half of the rooms farthest from the windows. The lighting circuit should be divided so that only the dark half of the room may be lighted when necessary.

6. The width of the rooms for unilateral lighting should not be much in excess of 20 feet, at least, in this locality.

7. For a room about 20 feet wide the glass-area floor-area ratio should not be much less than 20 per cent.

8. The rule that no point in the working plan should be farther from the window than twice the elevation of the tops of the window glass above the working plane is probably a safe one, although no observations were made at the exact limit indicated by the ruling.

9. The windows extend as near to the ceiling as possible, assuming a ceiling height of 12 to 14 feet.

10. The windows should extend as near to the rear wall of the room as possible, especially on the west side of the building.

11. The "reduced square degree" is a better measure for the sky vault which may be visible at a desk than merely the square degree.

12. The rule that every desk should have visible at least 50 "reduced square degrees" of sky vault is apparently a very good one.

13. Summer foliage materially reduces the extent of the visible sky vault as compared with that provided in winter.

14. Near-by trees, particularly large, tall ones, reduce the visible sky vault so materially as to suggest, from the standpoint of lighting alone, that all trees should be eliminated from plots of ground used for school instruction or study purposes. However, in order to meet the demand for the beauty and shade provided by trees, it would seem advisable to recommend that trees should never be planted closer than 50 feet from the school building, and then only provided they are kept topped and trimmed, so that their maximum height shall not exceed half the distance to the building.

15. The distribution of light over the rooms is better on the side of the building opposite the sun than on the same side as the sun.

16. The distribution of the light over the rooms was slightly more uniform on the second floor, where the glass-floor ratio is smaller than on the first floor, but this may be accounted for by the slightly larger visible sky vault.

17. The rooms that are in excess of 20 feet in width can be made to approximate this standard by placing the desks closer to the windows and to the front of the room, leaving a wider aisle on the side of the room farthest from the windows.

—P. D.

PRACTICAL DAYLIGHT CALCULATIONS FOR VERTICAL WINDOWS. *W. S. Brown. Tr. Illuminating Engin. Soc., March, 1926, vol. 21, pp. 225–240.*

SAWTOOTH DESIGN—ITS EFFECT ON NATURAL ILLUMINATION. *W. C. Randall. Ibid., pp. 241–272.*

PREDICTION OF DAYLIGHT FROM SLOPING WINDOWS. *H. H. Higbie and A. Levin. Ibid., pp. 273–310.*

FURTHER EXPERIMENTAL DATA ON THE PREDICTION OF DAYLIGHT FROM WINDOWS. *H. H. Higbie and A. Levin. Ibid., April, 1926, vol. 21, pp. 373–380.*

Papers presented before the Annual Convention of the Illuminating Engineering Society, Detroit, Mich., Sept. 15 to 18, 1925.

All four papers are well illustrated but are intended for the illuminating engineer and architect rather than for the hygienist. The papers are, however, of a decidedly practical nature and give charts and curves from which the optimum and the expected intensity of daylight in factories and general workplaces can be predicted.

The essential purpose of the paper by Brown "is to facilitate the reasonably rapid and accurate determination of daylight illumination in a room lighted by vertical windows. The primary aspects of the problem are emphasized; diagrams are given for the express purpose of showing separately the individual relative importance of such primary factors in any design; and a typical lighting problem is worked out and discussed at some length."

The paper by Randall is summarized as follows: "Sawtooth construction in industrial buildings has chiefly been used to avoid the admission of direct sunlight. On the premise that the windows should be sloped to obtain more light, the problem is to find the greatest slope that can be used so that direct sunlight will not enter under given conditions. The solution is presented, with typical examples, taking into account the various corrections that may have to be made.

"Due to the lack of information on the effect on illumination on the working plane of such elements as the height of windows, slope of windows, the span, and the condition of the inside reflecting surfaces, an analysis has been made of these various factors. The effect on illumination of such elements as the kind of glass used, glare reducers, etc.," is discussed.

In the last two papers rational formulae are derived for predicting illumination, and the predicted distribution of daylight illumination from windows in a building is verified by means of photometric measurements in that building.—P. D.

THE MEASUREMENT OF GLARE. *B. A. Nowakowski. Am. Jour. Hyg., Jan., 1926, vol. 6, pp. 1–31.*

This article is summarized as follows:

Direct peripheral glare is found to produce two effects, at least, in the eye. One, the local irritation, is due to contrast between the glare spot and the surrounding retina, and is proportional to the intrinsic brilliancy of the glare light. Besides this local irritation there is a depression of central vision which is due to too great a difference between the illumination of the glare spot and the illumination of the fovea. This depression in visual acuity for any given angle of light is independent of the intrinsic brilliancy of the glare light, but proportional to its candlepower. Discomfort is associated with both effects, local irritation and depression in visual acuity. Since the latter decreases with the distance of the glare light, and its angular position, there are distances, at every angle, where the depression of vision, due to the glare light, becomes zero. However, local irritation and discomfort still persist if there is still sufficient contrast between the glare spot and the surrounding retina.

The degree of depression of visual acuity was measured in the following way. The minimum illumination was measured, necessary to see a certain test object clearly

without a glare light, and then with a glare light of different candlepowers, at different distances, and in different angular positions. The difference between the two values of minimum illumination gave a quantitative measure of the degree of glare, in so far as it affects visual acuity. The minimum illumination at zero glare was taken as the unit of glare, and it was thus possible to say how many times more glaring one light was than another. Glare, measured in this way, was found to be proportional to $\frac{1}{\sin \theta}$, where θ is the angle between the glare light and the visual axis, corrected by $\cos \phi$, where ϕ is the angle between the retina and the normal to the beam of light. With the eye focussed at normal reading distance, glare was proportional to $\left(\frac{1}{d} - \frac{1}{d_0}\right)$, where d is the distance of the glare light and d_0 is the distance at which glare becomes zero. From this fact the following glare formula was derived:

$$\text{Glare} = 0.7\ CP \left(\frac{1}{d} - \frac{1}{d_0}\right)\left(\frac{\cos \phi}{\sin \theta}\right)$$

(for d in inches) or,

$$\text{Glare} = 0.06\ CP \left(\frac{1}{d} - \frac{1}{d_0}\right)\left(\frac{\cos \phi}{\sin \theta}\right)$$

(for d in feet).

—P. D.

A New Psychrometric or Humidity Chart. *C. A. Bulkeley. Jour. Am. Soc. Heating and Ventil. Eng., April, 1926, vol. 32, pp. 237–243.*

In practice, heating and ventilating engineers make use of a chart known as the Carrier psychrometric chart, which presents graphically the interrelation between the various physical factors of the air. Knowing the dry and wet bulb temperatures of the air, one can from this chart readily determine the physical conditions with respect to moisture content, latent and sensible heat, specific volume and other factors. Its accuracy, however, is limited and is not the same at high as it is at low temperatures. In order to overcome this defect Bulkeley reconstructed Carrier's chart on logarithmic co-ordinates, and in this respect only do the two charts differ.

The advantage of the new chart is that it is made more compact, and its accuracy is the same both at the low and at the high temperatures. In the original Carrier chart, where arithmetical scales are employed for both vertical and horizontal co-ordinates, the vertical spacing becomes nearly sixty times as great per degree of temperature at 140° as at 0°. In order to make the low temperature region legible, the upper temperature region becomes too large to plot on a chart of workable size. For this reason two and sometimes three different charts are necessary to cover the practical range of temperatures. By using logarithmic scales the degree intervals are about the same, or somewhat greater at the lower temperatures, and it is thus possible to construct a single chart with sufficient accuracy for a range in temperature of 200°. Another advantage of this new chart is that the relative humidity lines are straight and they can be arranged arbitrarily to suit the dimensions of the chart desired.

This new chart has been received very enthusiastically by the heating and ventilating engineers, and it is considered to be a worthy contribution to the art of heating and ventilating.—C. P. Y.

Ventilation of Engine-Rooms in Motor Vessels. *A. G. G. Thompson. Lancet, Jan. 16, 1926, p. 156.*

The engine room staff on ships propelled by Diesel and similar motors is stated to experience headache, drowsi-

ness, vomiting, loss of appetite, an evident pale yellow tinting of the skin, and a great susceptibility to an obstinate type of furunculosis. The symptoms are attributed to inadequate ventilation due to the construction of the engine rooms with the same ventilation as for steamships, which falls far short of a motor vessel's requirements. The position represented should be considered in association with the report of Vigné and Cury (Office internat. d'Hyg. pub., Bull. mensuel, 1925, vol. 17, p. 979; abstr. in THIS JOUR., 1926, vol. 8, p. 61), in which the amount of sickness on motor driven vessels was compared favorably with that on the same vessels when driven by steam; great liners, however, were considered, and possibly Dr. Thompson's observations refer to smaller craft.—E. L. C.

INDUSTRIAL MEDICAL SERVICE: MEDICAL DISPENSARIES AND HOSPITALS IN INDUSTRIAL PLANTS

MEDICAL EXAMINATION OF YOUNG PERSONS FOR FACTORY EMPLOYMENT. *G. A. Auden. Med. Officer, Feb. 6, 1926, pp. 57–58.*

This condensed article is a report made by the author to his Education Committee at Birmingham. He dwells on the present unsatisfactory position when the knowledge obtained by the school medical officer is not available when the youngster is being examined on entry to industry. He asks for a scheme of "following up" for the school medical service, and points out that many cases of previous illness, such as chorea, may leave no obvious sign, but are of profound importance when choosing an employment. A series of cases taken from one school in an industrial area is presented in tabular form to support the author's contention.—E. L. C.

THE MEDICAL EXAMINATION OF RAILWAY EMPLOYEES. *Paris Letter, Jour. Am. Med. Assn., March 27, 1926, vol. 86, p. 965.*

Medical examination of railway employees was recently discussed before the Academy of Medicine. Professor Guillain emphasized the necessity of examinations at intervals of five years for young persons and of three years for elderly employees. Especially neuropsychiatric and cardiologic examinations should be more frequent. Employees whose duties affect the public safety—particularly locomotive engineers—should undergo ophthalmologic examination every two years. Engineers subject to alcoholism should be dismissed at once. . . . .

Examination of vision should be very precise and should include color tests. The best method of examining an engineer would seem to be while performing his duties on his engine. When it is impossible to examine an engineer actually on duty, apparatus could be employed which would simulate actual conditions. Promptness in recognizing signals is an important factor, for an engineer may have to react to 200 signals on a 100-kilometer run, while going 80 kilometers an hour.

Functional examination of the pupils is very important. . . . .—K. R. D.

ABSTRACT OF THE LITERATURE OF INDUSTRIAL HYGIENE

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GENERAL

INDUSTRIAL HYGIENE IN AUSTRALIA. *D. G. Robertson.*

The progress of industrial hygiene in Australia up to date is condensed into this publication. Herein are stated the various scientific inquiries made into labor conditions; and the amount of research devoted to metalliferous mining, with regard to lead poisoning, dust phthisis, and pneumonia, indicates the importance of that industry in the subcontinent. Morbidity data for government departments are quoted which show the average days lost per annum as 6.8 for males and 11.3 for females; infectious diseases were responsible for about 25 per cent. of the whole time loss of both sexes. Much is certainly preventable and the saving of one day per worker per annum would be equivalent in Australia to the services of over 7,000 workers. The course of legislation in each of the states is outlined; here Victoria leads the way. The Commonwealth government now possesses a division of industrial hygiene through which concerted ac-

tion on a uniform basis may become established. The resolutions of interstate conferences, held in 1922 and 1924, are given in detail. A sketch is given of the compensation law which embraces occupational diseases; here New South Wales in reference to silicosis is ahead of most countries. The need for an industrial medical service is stressed; it is today provided only by a few employers who recognize it as good business. The document is a useful record of ground gained and of prospective action.—E. L. C.

Impressions of a Visit to Jugoslavia for the Purpose of Studying the Hygienic Conditions. *Abel. München. med. Wchnschr., March 19, 1926, vol. 73, pp. 492–495.*

One paragraph of this article is devoted to industrial hygiene in Jugoslavia. The law provides for an eight-hour day, but a longer work period can be adopted by the agreement of four-fifths of the workers. The employment of children under 14 years of age in industrial pursuits, and of young people under 18 and of women for night work is forbidden. Women are entitled to two months before parturition and to from two months to a year after. A room must be provided where the mother can nurse her child during working hours, and where there are more than twenty-five children of women employees a day nursery must also be provided. Industrial inspection is in force. Social insurance is regulated much the same as it is in Germany but it does not extend to agricultural workers, and thus it embraces only a small part of the total working class.—M. C. S.

SYSTEMIC OCCUPATIONAL DISEASES: OCCURRENCE, TREATMENT, AND PREVENTION

central nervous system

Occupational Injury and the Amyostatic Syndrome. *J. Löwy. Abstr. as follows from Zentralbl. f. inn. Med., Jan. 9, 1926, vol. 47, p. 41, in Jour. Am. Med. Assn., March 6, 1926, vol. 86, p. 729.*

Löwy reports two cases wherein a trauma provoked or aggravated Wilson's disease.—K. R. D.

circulatory system

Effect of Roentgen Rays on the Blood of Roentgen-Ray Workers. *P. B. Matz. Abstr. as follows from U. S. Vet. Bur. Med. Bull., Jan., 1926, vol. 2, p. 10, in Jour. Am. Med. Assn., March 20, 1926, vol. 86, p. 909.*

A complete blood examination was made of the 142 employees on duty in the roentgen ray laboratories of the United States Veterans' Bureau service, and Matz reports the findings. There was no demonstrable abnormality of the cellular elements of the blood, either numerically or morphologically, with the exception of a few isolated cases.—K. R. D.

The Problem of Cardiac Disease. *D. G. Robertson. Health, Commonwealth of Australia, Jan., 1926, vol. 4, pp. 14–20.*

Owing to the fact that 12.6 per cent. of all deaths occurring in Australia during the eleven years 1914 to 1924 were due to diseases of the circulatory

system, or almost twice as many as the deaths due to tuberculosis, Dr. Robertson urges the establishment of cardiac clinics in leading hospitals, a more careful clinical survey over children of pre-school and school age, and an extension of medical service to industry, so that those industrially engaged may be kept under surveillance.

The general principles governing occupations for those suffering from disease of the heart and some suggestions for suitable occupations, unskilled and skilled, are cited from the pamphlet on "Occupations for Cardiacs" of the New York Association for the Prevention and Relief of Heart Disease.—B. A.

POISONOUS HAZARDS AND THEIR EFFECTS: GASES, CHEMICALS, ETC.

THE BUREAU OF MINES ORSAT APPARATUS FOR GAS ANALYSIS. *A. C. Fieldner, G. W. Jones, and W. F. Holbrook. U. S. Bur. Mines, Tech. Paper 320, 1925, pp. 18.*

A description is given in this paper of the apparatus used in the United States Bureau of Mines gas laboratory at Pittsburgh, for the complete and partial analysis of gases.

. . . . A complete analysis—including carbon dioxide, illuminants, oxygen, carbon monoxide, hydrogen, methane, and ethane—can be made without connecting or disconnecting any parts. Since all other constituents are removed before the paraffin hydrocarbons are burned, larger amounts of the paraffins may be taken for combustion with oxygen, and more accurate determinations of methane and ethane can thus be obtained. The same argument holds true for hydrogen and carbon monoxide, which are determined by fractional combustion with copper oxide at 300°C. Either mercury or water may be used as the confining liquid in the burette, depending on the accuracy desired.

The apparatus is described in detail, with drawings, and the operating procedure is given with formulae for determining the percentage of carbon dioxide, illuminants, oxygen, carbon monoxide, hydrogen, methane, and ethane. Absorbent mixtures which may be used to remove gases are given. A table giving combustion data for the commonly occurring gases, vapors, and solids is included.—B. A.

CHRONIC BENZENE POISONING. *F. J. Rohner, C. W. Baldridge, and G. H. Hansmann. Abstr. as follows from Arch. Path. and Lab. Med., Feb., 1926, vol. 1, p. 220, in Jour. Am. Med. Assn., May 8, 1926, vol. 86, p. 1481.*

The case reported by Rohner *et al.*, though complete in presenting all of the features so far recognized, adds nothing that is new, except, possibly, the relative immunity of endothelial leukocytes in benzene (benzol, C_6H_6) poisoning and the absence of evidence of adult erythrocyte destruction. The necropsy also confirms the morbid anatomic changes described in animals. The established facts in chronic benzene poisoning are included in the following list: leukopenia, aplastic anemia, thrombocytopenia, aplasia of the bone marrow, and absence of inflammatory cell response to infection. The history of exposure to benzene in this case has been verified,

thus making the chain of evidence complete.—K. R. D.

NECROSIS OF THE SUPERIOR MAXILLA IN CHRONIC BENZOL POISONING AS CAUSE OF DEATH. *J. Löwy. Abstr. as follows from Med. Klin., 1926, no. 11, in München. med. Wchnschr., April 2, 1926, vol. 73, p. 588.*

Death was due to sepsis caused by necrosis of the superior maxilla as a result of chronic benzol poisoning.—M. C. S.

BENZINE POISONING. *N. Schustrow and E. Salistowskaja. Deutsch. Arch. f. klin. Med., Feb., 1926, vol. 150, p. 271.*

HABITUATION TO BENZINE. *N. Schustrow and E. Salistowskaja. Ibid., p. 277.*

Abstracted as follows in Jour. Am. Med. Assn., April 17, 1926, vol. 86, p. 1254.

Schustrow and Salistowskaja made experiments on inhalation of petroleum ether by rabbits or guinea-pigs. They found emaciation, aplastic hemolytic anemia, increased fragility of red cells, and a leukopenia affecting all the white cells. They explain the poisoning by the action of the substance on the lipoids. The serum in the poisoned animals contained less cholesterol than in the controls. They believe that with inhalation, more erythrocytes are affected than with internal administration.

Schustrow and Salistowskaja also studied the increasing resistance to poisoning with petroleum ether. The time of appearance of convulsions and of restitution furnished the basis for comparison. The animals in the first week had convulsions within thirteen to fifteen minutes after the beginning of the inhalation, and required fifteen minutes for recovery. At the end of the second week, they were able to stand three or four times more of the benzine. The convulsions began in seventy to ninety minutes and the animals recuperated in one or two minutes. After an injection of 0.1 to 0.2 gm. of lecithin in olive oil these animals became immediately as susceptible as unaccustomed animals. They conclude that the resistance is due simply to the loss of fat in the poisoned animals and consequently a diminished absorption by the blood. The administration of fat seems to be contraindicated during chronic exposure to benzine, but would seem advantageous in treatment. They mention Nick's patient who recovered after intravenous injection of 5 c.c. of a 10 per cent. lecithin emulsion in spite of poisoning with 88 gm. of benzene.—K. R. D.

INTOXICATION FOLLOWING THE USE OF COAL TAR PAINTS. *T. A. Kidston. Med. Jour. Australia, Feb. 13, 1926, vol. 1, pp. 188–189.*

The author, who is medical officer to a dockyard, reports the occurrence of cases of intoxication among men employed in painting the inner walls of bunkers and confined spaces on ships with certain coal tar paints. Premonitory symptoms were almost absent. Onset of muscular inco-ordination and even unconsciousness was sudden. Of the seven cases reported, fortunately none terminated fatally; all recovered after being brought into fresh air. The symptoms, which are given in tabular form, agree with those caused by the inhalation of fumes of

naphtha and benzine, both of which were present in paints used. After steps had been taken to ventilate compartments and to insure safety for any affected workmen, it was possible to continue the use of the coal tar paints without the occurrence of further cases.—E. L. C.

INDUSTRIAL POISONING FROM LOW CONCENTRATIONS OF CHLORINE GAS. *C. P. McCord. Jour. Am. Med. Assn., May 29, 1926, vol. 86, pp. 1687–1688.*

McCord describes a case of emphysema which he attributes to prolonged exposure to low concentrations of chlorine gas arising from work processes.—K. R. D.

ACUTE AND CHRONIC POISONING WITH HEAVY METALS. PART I. MANGANESE POISONING. *H. Handovsky, H. Schulz, and M. Staemmler. Abstr. as follows from Arch. f. exper. Path. u. Pharmakol., vol. 110, no. 5–6, in München. med. Wchnschr., Feb. 26, 1926, vol. 73, p. 380.*

In chronic poisoning in rabbits 50 per cent. of the manganese was very rapidly excreted in the feces but only traces in the urine. There was a strikingly large amount of manganese in the bile and pus, and also in the bone tissue. No relation exists between the amount of poison and the injury to the individual organs. Acute poisoning occurs only when a very high concentration of manganese is suddenly present in the blood; increasing paralysis of the central nervous system results. In chronic poisoning it is the liver that is chiefly affected; fatty degeneration occurs starting from Kupffer's cells.—M. C. S.

STUDIES IN INDUSTRIAL HYGIENE, NO. 6. AN INVESTIGATION CONCERNING THE INCIDENCE OF LEAD POISONING IN MOTOR-CAR PAINTERS. *C. Badham. Rep. Dir.-Gen. Pub. Health, New South Wales, for 1924, Section I-C, Indust. Hyg., pp. 90–100. Sydney, 1926.*

One hundred men of the motor car painting trade were examined with the result that fourteen were found affected by lead poisoning. Six of these have recently been compensated for their sickness. Twelve other men of the 100 examined were affected by slight lead poisoning, and in seventeen others the symptoms were suspicious but not sufficient to justify a diagnosis of lead poisoning. Eleven men were affected with disabilities not connected with their work, while forty-six showed no evidence of disability. The author states "that the incidence of lead poisoning is grave, and that it calls for the suppression of all processes creating lead dust, for the periodical routine medical examination of the employees, and the better ventilation of the paint shops. That to forbid the use of lead compounds in any painting process done indoors is an obvious remedy." Routine examination included determination of lead in urine, examination of urine for granular casts, Wassermann reaction, record of blood pressure, estimation of hemoglobin, and examination for stippling of red cells.—L. T. F.

GOVERNMENT BILL TO PREVENT LEAD POISONING. *London Letter, Jour. Am. Med. Assn., May 1, 1926, vol. 86, p. 1373.*

The text has been issued of the lead

paint (protection against poisoning) bill, introduced by the government to make better provision for the protection against lead poisoning of persons employed in painting buildings. The home secretary is given power to make regulations: (*a*) for prohibiting the use of any lead compound except in the form of paste or of paint ready for use; (*b*) the prevention of danger arising from the application of lead paint in the form of spray; (*c*) for the prevention so far as practicable of danger arising from dust caused by dry rubbing down and scraping; (*d*) for providing for the medical examination of persons employed in or in connection with painting with lead paint, and for the suspension from such employment of persons whose health is or appears likely to be injuriously affected thereby; (*e*) for securing facilities for washing during, and on cessation of, work to persons employed in painting; (*f*) for the use of protective clothing by persons so employed and for preventing clothes left off during work from being soiled by paint; and (*g*) for the distribution to persons so employed of instructions with regard to hygienic precautions to be taken. Clause 2 prohibits, after Nov. 19, 1927, the employment of women and young persons in painting buildings with lead paint, with the exception of apprentices in the painting trade under approved arrangements, and women or young persons engaged in decorative or other work excluded from the provisions of this section by an order of the secretary of state. Another clause gives power to an inspector under the Factory and Workshops Act to take samples.—K. R. D.

CASE OF LEAD POISONING WITH ONSET SIMULATING TRIGEMINAL NEURALGIA. *L. Foshay. Jour. Am. Med. Assn., May 29, 1926, vol. 86, pp. 1688–1689.*

The location of the pain, the patient's description of its character, the homolateral radiation to the arm, and the Valleix points of hypersensitivity seemed at first to indicate a diagnosis of tic douloureux of the neuritic type. The entire absence of premonitory symptoms, of vasomotor, secretory, and trophic disturbances, and the absence of a tic or other motor phenomena seemed to render such a consideration improbable, but it was not until the characteristic atrophy of the arm appeared that the diagnosis of trigeminal neuralgia finally could be abandoned.

In the literature on lead poisoning there are several reports of cranial nerve palsies due to lead. All of these have been painless pareses or paralyses. There is no reference in the literature, so far as the author knows, to lead neuritis involving the trigeminal nerve, of either the motor or the sensory divisions.—K. R. D.

BLOOD PRESSURE IN LEAD POISONING. *G. Invernizzi. Abstr. as follows from Clin. Med. Ital., 1925, vol. 56, p. 347, in Jour. Am. Med. Assn., April 17, 1926, vol. 86, p. 1253.*

Invernizzi has been investigating conditions as to the blood pressure in 369 cases of lead poisoning from 1910 to 1923. In acute lead poisoning and in acute exacerbations of chronic plumbism, the blood pressure is very high, but the sudden drop as other symptoms subside confirms the assumption of angiospasm as responsible

for it. In other chronic forms of lead poisoning, the pressure is low, as lead depresses the heart action. After it has entailed arteriosclerosis, the systolic pressure is high, but the diastolic is low. This is explained by a reflex action from the influence of the lead on the splanchnic nerves and kidneys.—K. R. D.

PROCEEDINGS OF A CONFERENCE TO DETERMINE WHETHER OR NOT THERE IS A PUBLIC HEALTH QUESTION IN THE MANUFACTURE, DISTRIBUTION, OR USE OF TETRAETHYL LEAD GASOLINE. *U. S. Pub. Health Bull. No. 158, Aug., 1925, pp. 116.*

INDUSTRIAL POISONING FROM METHYL CHLORIDE. *U. S. Month. Labor Rev., Feb., 1926, vol. 22, pp. 437–438.*

This is a short compilation of hazards connected with the use of methyl chloride, taken from well-known authorities on industrial poisons.—B. A.

DUST HAZARDS AND THEIR EFFECTS

INDUSTRIAL DUST AND PULMONARY TUBERCULOSIS. *Jötten and Arnoldi. Abstr. from paper read at meeting of Med.-Naturwissenschaftl. Gesellschaft in Münster i. W., Dec. 14, 1925, in München. med. Wchnschr., Jan. 29, 1926, vol. 73, p. 221.*

Jötten gave a report of experiments carried out in the hygienic institutes of Leipzig and Münster for the purpose of studying various industrial dusts with regard to their furthering or retarding effect on tuberculosis.

Inhalation experiments were made on rabbits over a long period of time with steel, lime, porcelain, and coal dust, and then with larger quantities of dust to determine whether or not the various dusts produced lung changes which offered suitable soil for the tubercle bacilli added through inhalation during or at the close of the experiments. Steel dust and, in most of the experiments, porcelain dust also had a furthering effect on tuberculosis; lime dust had no such effect. No definite conclusion could be drawn from the experiments with regard to coal dust. The bactericidal effect on tubercle bacilli, which many other investigators maintain that they have seen, was not observed by Jötten.

The course of the tuberculosis in the rabbits was followed with X-ray pictures.—M. C. S.

OCCUPATIONAL INFECTIOUS DISEASES: OCCURRENCE, TREATMENT, AND PREVENTION

BEAT-KNEE AS A FORM OF RHEUMATISM. *G. A. Stephens. Lancet, June 26, 1926, vol. 1, p. 1280.*

Ten consecutive cases of beat knee, or subcutaneous cellulitis over the patella in miners, exhibited a rheumatic tendency, indicated by a liking for vinegar and meat and an inclination to suffer from rheumatism. Beat knee is held to be a local expression of

a constitutional disturbance, which is made manifest by local irritation.—E. L. C.

TUBERCULOSIS IN BAKERIES. *J. Parisot and G. Richard. Bull. de l'Acad. de méd., Paris, Jan. 5, 1926, vol. 95, p. 23.*

For abstract of this report see THIS JOURNAL, 1926, volume 8, Abstract Section, page 138.

TUBERCULOSIS IN TOBACCO WORKERS. *E. von Müller and Berghaus. Abstr. as follows from Ztschr. f. Tuberk., Feb., 1926, vol. 44, p. 273, in Jour. Am. Med. Assn., April 17, 1926, vol. 86, p. 1257.*

Müller and Berghaus were delegated to study the cause of the high tuberculosis mortality in a rural district near Mannheim. It seemed at first that work in tobacco factories was to be incriminated. Yet they found that these workers are weak before they start working there, the strong ones preferring better paid occupations. The infection in the plant is certainly possible, but it seemed that infection in the home was a more important factor. The hygienic conditions in the homes of most of the patients were horrible.—K. R. D.

OCCUPATIONAL AFFECTIONS OF THE SKIN AND SPECIAL SENSES

CHLORACNE. *Nicolas and Pillon. Paris méd., Jan. 16, 1926, pp. 62–68.*

In this review of the subject, the writers have added another case to the one they reported last year. This man was working in the manufacture of chlorine from chloride of sodium by the electrolytic process. It was noted that others were affected who were laboring, as he was, on the repairing of the electrodes. These are made of charcoal mixed with pitch. From a careful analysis of the products given off at the anodes, a chemist, Mr. Sisley, has isolated chlorinated naphthalene which he considers is the peccant agent. The first case reported by Messrs. Nicolas and Pillon occurred in a zinc galvanizing plant, and they are unable to point out the exact cause.

The lesions in both instances were characteristic of the condition.—R. P. W.

SPOROTRICHOSIS, AN OCCUPATIONAL DERMATOSIS. *H. R. Foerster. Med. Jour. and Rec., April 21, 1926, vol. 123, p. 530*

Sporotrichosis, an infective granulomatous disease of world wide distribution, has shown an endemic occurrence in certain parts of the temperate zone, particularly in the Mississippi River basin. The disease is peculiar to outdoor workers; most of the cases in the United States being found among farmers, horticulturists, and the like. Of 148 American cases reviewed, 111 showed a primary involvement of the distal parts of the upper extremity. Most of the infections produced an inability to work. Fourteen cases have been reported among the employees of a Wisconsin tree nursery; of these, ten had definitely acquired the infection from the barberry shrub. This shrub, having a distribution in nature similar to that of the sporothrix,

is considered as a host of the organism and as a possible disseminator of the disease. The occupational hazards and disabilities peculiar to sporotrichosis entitle it to consideration among the occupational dermatoses.—R. P. W.

EYESIGHT IN INDUSTRY. *J. E. Hannum. Indust. Psychol., March, 1926, vol. 1, pp. 203–213.*

By way of illustrating what is being done in industry toward eyesight conservation, the author cites the work of a number of companies. In every case applicants for employment are given a visual acuity test; transportation companies test also for color perception and in some instances for errors of refraction. Several of the companies examine the eyesight of their permanent employees at regular intervals, and make every attempt to correct any causes of defective vision produced by working conditions.

Instructions are given for conducting and recording visual acuity tests, and sample charts for distance and near tests and a suitable record form are shown. A list of the requisites for acuteness of vision of employees of the Pennsylvania Railroad is given.—M. C. S.

OCCURRENCE AND PREVENTION OF INDUSTRIAL ACCIDENTS

THE HUMAN FACTOR AND INDUSTRIAL ACCIDENTS. *H. M. Vernon. Internat. Labour Rev., May, 1926, vol. 13, pp. 673–683.*

Not less than 90 per cent. of industrial accidents are due in greater or less degree to some failure on the part of the human subject involved. Temporary inattention is of great import; it is influenced by monotony and by distractions, by speed of production and by fatigue, and by alcoholism.

The incidence of accidents is also modified by temperature, ventilation, and illumination, and by the experience and age of the workers. Instances drawn from research investigations are quoted in support of statements made to justify the claim that accident prevention must first and foremost be approached from the viewpoint of the human factor. For this purpose cultivation of a safety habit of mind in workers is strongly advocated.—E. L. C.

THE COMBINING OF HEALTH AND ACCIDENT SERVICES BY INDUSTRY. *A. R. White. Pub. Health Jour., Feb., 1926, vol. 17, pp. 76–82.*

The close relationship between frequency of accidents and poor sanitary and public health conditions is emphasized. Investigation of lumber camps in Ontario revealed that the greatest number of accident cases "were axe cuts and saw cuts and that, with proper care, few of these cases should have gone to compensation had not infection set in due to lack of first aid." In the thirty companies investigated, of 500 open wounds during the season's work, 60 per cent. were infected when first seen by the doctor, so that primary suture was impossible. The temporary disability was, therefore, extended four or five

times what it normally should have been. This accident cost is, of course, passed on to the purchaser of lumber.

A plan is outlined wherein the company physician is to teach first aid to the camp clerk, facilities to be established at every camp; the foreman of each camp is to be responsible for directing each injured man to the first aid officer; both foreman and first aid officer are to be responsible to the woods boss or manager, who is to report to the accident engineer or to the Lumbermen's Association any failure in the efficiency of this organization. The industrial physician is to enter into a contract annually with the company and agree to take an interest in accident prevention and to do all in his power to hasten the return to work, consistent with good service, of all men injured. The company is to provide light work for men who may be returned to camp by the physician but who are not yet able to go back into heavy work.—B. A.

We Cut Accidents in Half. *F. T. MacFeely. Factory, Feb., 1926, vol. 36, p. 275.*

During five years (1920 to 1924) minor accidents were reduced in the S. F. Bowser and Company, Fort Wayne, Ind., from 10,342 to 6,012, and major accidents, those calling for compensation, from 215 to 31. This reduction has been brought about through the organization of a shop safety committee, through the services of a physician who is at the plant two hours of every working day, and a first aid attendant constantly at the plant hospital during working hours. Safety bulletins, changed two or three times a week and posted conspicuously throughout the plant, have been found effective. A physical examination for all employees has recently been established.—B. A.

Accidents to Employees of the New South Wales Government Railways and Tramways. *Health, Commonwealth of Australia, March, 1926, vol. 4, p. 56.*

During 1924, there were 7,356 cases of accidents among an average staff of 51,710, resulting in 102,809 days' sick leave. "An average of 14.2 per cent. of employees were therefore injured during this year, as opposed to an average of 13.8 per cent. during the five years 1919–1923. The average number of days' sick leave per case of accidents amounted to 14.05 days, as against an average of 14.22 days during the years 1919–23, while the number of days lost per total employees was 1.99 in 1924, as against 1.97 in 1919–23."

Of the accidents in 1924, 57.7 per cent. were "due to want of care on part of injured employee" and 4.9 per cent. were "due to the fault of another employee." Injuries to upper limbs happened in 37 per cent. of the accidents, to lower limbs in 34.5 per cent., to head and face in 15.3 per cent., and to the trunk in 12.7 per cent. Only 0.5 per cent. of the accidents were fatal.—B. A.

Mechanical Safeguards in Rotary Drilling. *H. C. Miller. U. S. Bur. Mines, Tech. Paper 369, 1925, pp. 38.*

The purpose of this report, which is the first in a series on safety work in oil fields, is stated to be "to spread information as to methods of care and

safeguards used to protect life and limb from the dangers incident to drilling for oil and gas, also to encourage the installation of safeguards at drilling wells so as to reduce machinery hazards to a minimum.

"Various safeguards are shown in the text, but when safeguards are built from the drawings given care should be taken that the dimensions are first checked, as the distance between floor and headboards and the diameter of the sprockets differ with different set-ups and makes of machinery.

"The Bureau of Mines earnestly invites those interested to offer suggestions and to comment freely on any of the subjects treated."

Safeguards used in the oil fields of California on rotary draw works, on the rotary table, and on the single and twin cylinder drilling engines are discussed, and drawings and illustrations are given showing the installation of the guards described.—B. A.

INDUSTRIAL SURGERY

COLLES' FRACTURE. *F. J. Cotton. Indust. Doctor, Feb., 1926, vol. 4, pp. 23–36.*

The essential trouble met with in handling Colles' fracture today is a backward rotation and supination of the lower fragment. Dr. Cotton gives his treatment as "a reduction by traction, flexion, pronation around the head of the ulna as a fixed point." He holds the wrist in the flexion position by a light plaster of Paris bandage, carried from the knuckles around the elbow, the arm being carried in a sling in that way. At the end of a couple of weeks it is brought down into an ordinary splint. The fingers are left free from the beginning. At the end of three weeks in a young, vigorous individual the union is solid enough to stand moderate use if protected by an adhesive strap with a pad under the ulna. At the end of six weeks, in such an individual, union of the bone is usually strong enough to allow work with it. Exceptions to this routine occur, especially with women in middle age or later having deficient calcium content in the bones. These cases have to be treated by longer protection, but not by longer fixation. Dr. Cotton emphasizes the need of active motion, and not passive motion, mild active motion being started as early as possible.

Certain cases develop a "traumatic arthritis"—attempts to move the joints result in more stiffening rather than less, in pain, and in a certain amount of heat and local swelling. The location of foci is important, and the prompt abandonment of active treatment. A rest splint which can be easily taken off and put on is necessary, and the application of heat. Sometimes a banjo splint, with slow traction for twenty-four hours for a week or so, is needed. These cases require time, sometimes six months, before usefulness is attained.

Several variants of the Colles fracture are cited. The fracture of the radial epiphysis, which is a product of the automobile and occurs commonly in truck chauffeurs, is a hyperextension fracture and needs adequate protection.

A description of the slides shown is

given. Discussion followed Dr. Cotton's address.—B. A.

Report of Committee on Questionnaire on Treatment of Colles' Fractures. *Indust. Doctor, Feb., 1926, vol. 4, pp. 38–41.*

Answers to the questionnaire sent to members of the New York State Society of Industrial Medicine were received from thirty-seven members, covering 6,199 Colles' fractures. All except one use passive motion; practically all use massage, some starting in two or three days, others at the end of the third and fourth week; all but eight use the normal position of the arm, about 25 per cent. reporting the use of the "pistol shot" position; only three reported using the circular cast, the rest using basswood splints or molded plaster anterior and posterior; some 66 per cent. use an anesthesia in reduction; the average period of disability is about six weeks; and a third of those answering the questionnaire believe that too early motion is frequently followed by bad results.—B. A.

INDUSTRIAL PHYSIOLOGY: NUTRITION, METABOLISM, FATIGUE, ETC.

Professional Wrestlers. *A. E. Lampé et al. Abstr. as follows from Deutsch. Arch. f. klin. Med., Dec., 1925, vol. 149, p. 317, in Jour. Am. Med. Assn., Feb. 20, 1926, vol. 86, p. 587.*

Lampé, Weltz, Heinrich, and Straubel examined repeatedly twenty-one professional wrestlers before and after the bouts. One of the subjects had all the clinical signs of a syphilitic insufficiency of the aorta; another had a chronic nephritis with a blood pressure of 240 mm. Hg! The majority had rheumatic changes in the left pectoral muscle. Lack of training may entail a dilatation of the heart after the bout. The same heart may become smaller later on, when the man is in good training condition. They believe that this together with an increased blood pressure and quick return of the pulse toward a normal frequency are good signs. Enlargement of the heart with lowered pressure and persisting acceleration of the pulse indicate in their opinion a bad cardiovascular condition. They found in the majority of wrestlers after the bout a low alveolar tension of carbon dioxide—sometimes only 18 mm. Hg. This is probably due to the hyperpnea during the fight.—K. R. D.

Tests to Determine Suitability for Work under Conditions Which Render Breathing Difficult. *E. Hörnicke and O. Bruns. Abstr. as follows from Med. Klin., 1926, no. 9, in München. med. Wchnschr., March 19, 1926, vol. 73, p. 505.*

The functional capacity of a man wearing a gas mask is not dependent on the kind of apparatus so much as on his general personality and especially his constitution. The latter is in turn determined by the quality and the efficiency of his breathing capacity, normal weight, bodily structure, vital capacity, breathing rhythm, etc. Op-

timal experimental subjects can compensate for the shortcomings of an apparatus.—M. C. S.

First Principles of Industrial Posture and Seating. *N. Y. State Dept. Labor, Bur. Women in Industry, Special Bull. No. 141, 1926, pp. 13.*

This report gives in brief the material contained in Bulletin No. 104, published in April, 1921 (see This Jour., 1921–1922, vol. 3, Abstr. Section, p. 135).

Individually adjustable chairs are considered more satisfactory than chairs of different sizes. Seats should be saddle shaped, shallow, and wide enough to allow room for the fleshy parts of the body. They should slant downward toward the back—about 1 inch for work in which it is not necessary to lean forward, and not more than 1/2 inch if the worker has to lean forward. There should be some support for the small of the back. The back rest "can be as small as the requirements necessitate and still be effective if it is properly placed at the 'small of the back.'" The lower edge should be not less than 6 nor more than 7 inches above the seat. From the point of view of both comfort and durability, chairs with a wooden back and seat and a metal frame are considered the best type for a factory.

Foot rests should be provided when the chair is so high that the worker cannot rest her feet comfortably on the floor. They should be wide enough for the entire soles of both feet and should preferably be attached to the workbench or the floor.

Correct posture requires also that the worker be in proper relation to her work. Continuous sitting is as harmful to the worker as continuous standing. Variation in posture—the sitting-standing principle—is therefore recommended.—M. C. S.

WOMEN AND CHILDREN IN INDUSTRY

Work in the Textile Industry and its Harmfulness for Pregnant Women. *E. Martin. Abstr. as follows from Monatschr. f. Geburtsh. u. Gynäk., April, 1926, vol. 73, in München. med. Wchnschr., April 30, 1926, vol. 73, p. 753.*

On the basis of the opinion of M. Hirsch and Dr. Dietrich, the textile workers' union sent a petition to the German government, requesting lasting and effective protection for pregnant women and for girls engaged in industrial work. On the basis of his own observations, the author refutes the assertions made. It is his opinion that the tasks of textile workers are not to be assessed as highly as those of a pregnant housewife. He considers the present provisions as satisfactory.—M. C. S.

The Protection of Infants and Mothers in Soviet Russia. *A. Dworetzky. München. med. Wchnschr., March 12, 1926, vol. 73, pp. 463–464.*

Day nurseries are provided in the cities for the children of working women. In 1923 there were 447 and at the close of 1925 there were about 778. This service is entirely free of charge.

The laws for the protection of workers and for insurance contain a number of provisions for the health protection of women and prospective mothers. Women who do physical work are given leave of absence for eight weeks before and eight weeks after delivery; women engaged in office and mental work are allowed six weeks before and six weeks after delivery. After a miscarriage the former are allowed three weeks; the latter, two weeks. Seamstresses and tailoresses who work on sewing machines operated by foot, and ironers are given two days during menstruation. In all these cases the women receive compensation from the insurance offices just as in the case of temporary disablement.

Working women, all of whom are compulsorily insured in Soviet Russia, and wives of insured men receive from their insurance company at childbirth special funds to be used for the newborn child. Nursing mothers are given a half hour at least every three and one-half hours for nursing their babies, and this time is reckoned as part of the working time. Pregnant and nursing women are prohibited from doing night work or overtime work. Night work is prohibited for women generally, except for such occupations as telegraph and telephone operating, for which it is allowed provisionally. Employment of women in especially heavy work and in occupations hazardous to health is forbidden. These laws and provisions not only exist on paper but are strictly enforced. —M. C. S.

PROTECTION OF CHILDREN IN INDUSTRIAL LIFE. *L. Bard. Rev. de crim., psiq., etc., Dec., 1925, vol. 12, p. 703.*

INDUSTRIAL SANITATION: FACTORY CONSTRUCTION, ILLUMINATION, VENTILATION, HEATING, WATER SUPPLY, SEWAGE DISPOSAL

ROCK AND AIR TEMPERATURES IN DEEP-LEVEL MINES. *M. O. Tillard and E. C. Ranson. Jour. Chem., Metall. and Min. Soc. So. Africa, Feb., 1926, vol. 26, pp. 184–205.*

In mining work there is scarcely a factor of more vital influence on health, safety, and efficiency than ventilation. Mines must be ventilated in order to reduce the temperature of the air at the working places underground, and to provide a supply of fresh air in order to dilute and remove the inflammable gases, dusts, and noxious fumes. The ventilating current in passing from the surface to the working places in the mine is heated by contact with the rock and by autocompression. Owing to the fact that rock temperature and barometric pressure increase with depth, there is a level at which the ventilating current is heated to a degree above that in which men can work safely. This limits the working depth of a mine.

Tillard and Ranson made a thorough study of the heat acquired by the ventilating current at different depths and under different surface conditions in the Village Deep Mine in South Africa. This mine is per-

haps the deepest one in the world, but its geothermal gradient is considerably flatter than that of most countries.

The most important aspect of this investigation is to determine the conditions likely to be met beyond the present working level, and thus to find out in advance the depth to which it is possible to go with the present facilities and under existing conditions. The minimum cooling power aimed at by the authors is 7.5 millicalories per square centimeter per second for places where there is a through ventilation, and 5 millicalories per square centimeter per second for the dead ends. Taking this as the minimum ventilation standard, it appears that the Village Deep Mine is approaching its maximum working depth under the existing conditions. The authors, however, are experimenting along lines of local cooling by ice. In their opinion this method seems to be practical and it may prove of considerable benefit in ultradeep mining.

While this paper deals largely with the physics of mine ventilation, it is very informative and interesting from the practical viewpoint because it discusses possibilities for ultradeep mining. The data presented in the paper in the form of tables and charts give perhaps the most thorough and complete information in the physics of mine air.—C. P. Y.

INDUSTRIAL MEDICAL SERVICE: MEDICAL DISPENSARIES AND HOSPITALS IN INDUSTRIAL PLANTS

THE WORK OF RAILROAD PHYSICIANS. *P. M. v. W. Palthe. Abstr. as follows from Nederl. Tijdschr. v. Geneesk., Nov. 28, 1925, vol. 2, p. 2407, in Jour. Am. Med. Assn., Feb. 6, 1926, vol. 86, p. 456.*

This is an address delivered at the semicentennial of the Netherlands Society of Railroad Medical Officials. Palthe emphasizes the importance of the combination of headache, somnolency, and partial or total unconsciousness, as something which requires at once expert institutional observation and tests. He describes some typical cases showing the danger of wasting time before discovery of the cause. Detection of malingering is often possible only with expert study of conditions. Factitious seizures in one case were not interpreted correctly for two years, the man receiving workmen's compensation, and loafing. In his repeated falls he never injured himself, and there was no tongue biting or incontinence. Palthe insists on the beneficial effect of treating the results of an emotional shock as a trifle, and getting the victim to resume, more or less completely, his ordinary occupation at once. This reduces the tendency to traumatic neuroses: When a rider falls off in the riding school, a good riding master gets him back on the horse and riding again at once, without asking any suggestion breeding questions as to how much he is hurt, etc. The layman often knows the advantage of this even better than physicians. To order rest

after a nervous shock is often almost the worst thing that can be done. Unfortunately it is indispensable with grave physical injuries, but the neurotic element should be investigated by experimental psychologic measures as promptly as possible. He reiterates that such an investigation runs no risk of rousing or aggravating neurotic phenomena, as some seem to fear. Even when there is organic injury, he advises to have the patient keep at work unless it directly aggravates the injury or is dangerous for others. To condemn a man to idleness is to anchor and perpetuate any neurotic tendency. He urges consultation and co-operation between medical officials in such cases to provide the patient with partial occupation if he is unable to resume entirely his former task. Productive work—not merely keeping busy—is such a sovereign remedy against disability that no pains should be spared to realize it. The neurosis once developed, nothing can be accomplished with the patient idle at home, and very little in the hospital. An institution where the neurotic, the partially disabled, could do good productive work would save a treasure of work accomplished and enjoyment of life now absolutely wasted. In conclusion he remarks that a traumatic neurosis requires a predisposition as well as a trauma, and that it should be the task of the medical official to detect this predisposition beforehand, and keep the man out of positions liable to entail trauma. It is high time, he adds, that the officials of all big business should be guided by the psychic as well as the physical capacity of the employee in assigning him to a position.—K. R. D.

TEN YEARS OF INDUSTRIAL HOSPITALS. *S. DeHart. Hosp. Management, Feb., 1926, vol. 21, pp. 62–64.*

The author is director of the hospital and employment departments of The R. K. LeBlond Machine Tool Company, of Cincinnati. The Company hospital started in a small room of an old office building in 1913; the present hospital consists of ten rooms in the new plant, is equipped to handle any and all emergencies which may arise in the course of the day's work, and represents an investment of approximately $30,000. A dark room was installed to care for the eye work of the hospital. In four years, eye accidents where foreign bodies (mostly floating particles) were extracted from the eyes were reduced from 5,016 at a cost of over $3,000 to 789 at a cost of $7.50. A dental department was installed at a cost of $1,800; accurate records which were kept show that the first year this department was in operation there was an economic saving of $2,200 to the Company. A nose and throat room was established, primarily to prevent nose and throat conditions due to colds from becoming serious; during the influenza epidemic this room thoroughly justified its existence. In 1922 the hospital and employment and other personnel activities were consolidated, at a saving annually of $8,500 in salaries alone.

During the year 1924 there were 300 more hours lost from shop injuries than during 1925; total compensation for shop injuries amounting in 1925 to $438.63, including specialist's fees, X-rays, etc. Frequency rate for accidents in 1925 was highest in July (103) and lowest in May when there were

no hours lost in 72,220.7 man hours worked. Days lost through accidents have been reduced from 560 in 1915 to 151 in 1925.—B. A.

INDUSTRIAL PSYCHOLOGY AND INDUSTRIAL MANAGEMENT IN ITS HEALTH RELATIONS

THE ACQUISITION OF MUSCULAR SKILL IN INDUSTRY. *G. H. Miles. Jour. Nat. Inst. Indust. Psychol., Jan., 1926, vol. 3, pp. 45–50.*

The essential feature of skill is the ability to modify, as required, a series of movements that are in the main habitual; but most of the present methods of training for skilled occupations in industry produce a group of habits which masquerade as skill. The newcomer is often put alongside a skilled worker, and strives to attain the speed or quality of production of the practised worker, regardless of the acquirement of the intermediate processes needed for final success, and the avoidance of a wasteful expenditure of energy. The preferable method is to analyze the general movements required, to classify them according to similarity with known everyday movements, and to devise simple methods for the transition from one to the other. Simple apparatus should be devised which will show to the beginner, while the movement is in progress, in what ways his movement is departing from the standard required. It should, however, be pointed out that in industry, just as in sport, too slavish an imitation of another person's style is fatal.—H. M. V.

MENTAL STATE OF CHAUFFEURS. *A. Ameghino. Abstr. as follows from Rev. d. l. Soc. arg. de neurol. y psiq., Dec., 1925, vol. 1, p. 167, in Jour. Am. Med. Assn., May 29, 1926, vol. 86, p. 1735.*

LOCAL CHAUFFEURS FROM PSYCHIATRIC STANDPOINT. *A. Ameghino. Rev. de crim., psiq., etc., Dec., 1925, vol. 12, p. 654.*

Ameghino deplores that the Buenos Aires regulations for licensing of automobile drivers omit all reference to the mental condition; only the physical qualifications are considered. One truck driver was brought to the hospital on account of sudden cerebellar motor inco-ordination, and an epithelioma was found at necropsy in the left ventricle; it must have been long in developing. A taxi driver was brought in in an epileptic somnambulistic state. He had been in the habit of holding his feet constantly in a certain position so that if a seizure developed he would unconsciously brake the cab. His brother happened to be in the vehicle and brought him to the hospital while still in the dazed condition. The number of automobile accidents has increased from 813 in 1915 to 2,580 in 1924. In the discussion that followed, Oliveira Esteves presented a motion urging the city authorities to provide for periodic examination of motor drivers. Psychiatric tests are not necessary, only a good clinical examination with study of the anamnesis.—K. R. D.

INDUSTRIAL HEALTH LEGISLATION: COURT DECISIONS: WORKMEN'S COMPENSATION AND INSURANCE

REVISED RULES AND REGULATIONS PERTAINING TO THE PAINTING BUSINESS. EFFECTIVE JANUARY 1, 1926. *Mass. Dept. Labor and Industries, Div. Indust. Safety, Indust. Bull. No. 13, 1925, pp. 7.*

These rules and regulations supersede those adopted in 1915. The rules cover general safety provisions, registration, rigging, swinging staging, interior scaffolds, health requirements, and penalty for violation; in the recommendations there are sixteen suggestions for safety and six for health of employees.—B. A.

HERNIA AS AN INDUSTRIAL ACCIDENT. *L. Ribeiro. Abstr. as follows from Brazil-med., Nov. 28, 1925, vol. 2, p. 311, in Jour. Am. Med. Assn., April 3, 1926, vol. 86, p. 1102.*

Recent legislation in Brazil on workmen's compensation has raised the question confronting other countries, namely, when can a hernia be regarded as an industrial accident? The Brazilian law requires for accepting this that the accident must be the sole and single cause of the hernia. But the courts have interpreted the law otherwise. In other countries it is the general opinion that of 1,000 cases of hernia, an industrial accident might be incriminated for it in only two or three instances. Ribeiro's experience with sixty-five cases testifies to the same approximate proportion. It is only exceptionally that a hernia can be ascribed to physical injury as it is almost always of slow development, in persons congenitally predisposed to it. The traumatism does not represent the principal cause but merely aggravates the preexisting lesion of which the bearer may not have been aware. Systematic physical examination of all workmen, as is done in military circles, would solve the problem.—K. R. D.

HEALING PERIOD IN PERMANENT PARTIAL DISABILITY INJURIES, WISCONSIN. *U. S. Month. Labor Rev., Feb., 1926, vol. 22, pp. 464–466.*

Reference is here made to the study published in October, 1925, by the Industrial Commission of Wisconsin, based on its own experience with a view to establishing a standard for the making of specific awards for injuries. The determination of a "normal healing period" was approximated by noting the point where a marked decrease occurred in the number of cases terminating, according to tabular records of the cases.—B. A.

SO-CALLED TRAUMATIC NEUROSES. *I. K. Bonhoeffer. Abstr. as follows from Deutsch. med. Wchnschr., Jan. 29, 1926, vol. 52, p. 179, in Jour. Am. Med. Assn., April 3, 1926, vol. 86, p. 1103.*

Bonhoeffer regrets that the practical consequences have not kept pace with the development of scientific knowledge on the so-called traumatic neuroses. The symptoms following real concussion of the brain resemble Korsakoff's syndrome, or they consist of a more or less pronounced amnesia, or convulsions, or disturbances of

tolerance for alcohol and periodic depressive states. They can be easily distinguished from the purely functional troubles. Fright may produce a vasomotor complex, but only for a short period, unless there is the wish to draw advantages from it. Traumatic hysteria is not a disease, but only a psychologic reaction which occurs only with certain wishes and disappears if they are given up. The complaisant or ignorant physician injures not only the state or the insurance company, but also the victim of the trauma, who keeps his symptoms as long as he can hope for compensation. Hospitals for soldiers with traumatic neuroses were required for their own soldiers, never for the millions of prisoners of war who knew that they were out of danger. He agrees with Hauptmann's opinion that no compensation should be allowed in "compensation hysteria." He points out that experience on the causal relation between liability legislation and traumatic hysteria is old, as well as the knowledge that such subjects recover after getting an indemnity. As long ago as 1894, Ricolins spoke of "gold treatment which can be made with bank notes." The diagnosis is quite safe, only injuries of the head require special attention. As long as the law grants an indemnity, a single payment is preferable to doling out the sum, which only prolongs the symptoms. He is against any compensation where the wish factor is predominant. In mixed cases he agrees with the findings of the Swiss conference to the effect that if the symptoms are such that they would not occur in a noninsured person, the claim should be rejected.—K. R. D.

NEUROSES OF AVIATORS. *H. Meier-Müller. Abstr. as follows from Schweiz. med. Wchnschr., March 27, 1926, vol. 56, p. 268, in Jour. Am. Med. Assn., May 29, 1926, vol. 86, p. 1733.*

Meier-Müller, who is chief surgeon of the Swiss Aviator Corps and has himself experienced a few crashes, deals with the sequels of such injuries. The comparatively long period of several minutes which elapses between the realization of the imminent disaster and the final crash is horrible, and an intense reaction—beginning usually after a day or two of euphoria—is only natural. The best treatment and prevention of a neurosis consists in returning the patient to his occupation as speedily as possible. He succeeded in this way even with men whose skulls had been fractured more than once. The Swiss aviators are much better off, financially and otherwise, in service, than with a disability pension. Consequently, there are no neuroses among them. He is opposed to any compensation in the traumatic "wish" neuroses.—K. R. D.

WHEN IS A PERSON SUFFERING FROM PULMONARY DISEASE CAPABLE OF WORK? *E. Guth. Abstr. as follows from Med. Klin., 1926, no. 6, in München. med. Wchnschr., Feb. 26, 1926, vol. 73, p. 382.*

The author gives the points which must be kept in mind in order to distinguish between the subjective estimation of the insured person and the objective facts in the case.—M. C. S.

REHABILITATION OF DISABLED EMPLOYEES

PHYSIOTHERAPY: A NECESSITY IN THE TREATMENT OF INDUSTRIAL WOUNDS. *F. H. Walke. Arch. Physical Therapy, X-Ray, Radium, Jan., 1926, vol. 7, pp. 16–24.*

In the rehabilitation of those who have been injured in industry, physiotherapy plays a vital part in assisting the effectiveness of the surgical treatment as well as in treatment after the surgeon is done. Diathermy, galvanism, high frequency and sinusoidal currents, radiant heat and light, etc., have been found effective in the treatment of infections, back injuries, fractures and joint injuries, of painful stumps following amputation, of burns and deep tissue wounds, and of injuries to the chest and to the head and brain coverings. The psychic neuroses following the actual wounds have been disposed of through the application of psychology and physiotherapy with benefit to the patient, to his family, and to his employer.

Cases are cited in the discussion showing the practical and economic value of the use of physiotherapy in industry.—B. A.

OCCUPATIONAL THERAPY. *J. Walker. Tubercle, March, 1926, pp. 281–283.*

The writer describes many and various efforts made to introduce occupational work as a therapeutic agent at a tuberculosis sanatorium. The story is one of repeated effort and only partial success from the economic point of view. Still, much work connected with a sanatorium can be and should be done by the patients, and certain posts, such as domestic service for men and women, nurses, clerks, garden helpers, and poultry workers should be filled by ex-patients. Occupational therapy is held to be necessary, and when one plan fails, some other must be tried unless numbers of lazy, unemployable people are to be discharged from sanatoriums. There is no indication of the assistance of industry being obtained; all the efforts seem to have been carried out at the sanatorium.—E. L. C.

ABSTRACT OF THE LITERATURE
OF
INDUSTRIAL HYGIENE

VOLUME VIII NOVEMBER, 1926 NUMBER 11

DUST HAZARDS AND THEIR EFFECTS

REPORT OF THE MINERS' PHTHISIS MEDICAL BUREAU FOR THE TWELVE MONTHS ENDING JULY 31ST, 1924. *Union of South Africa. Government Printers, Capetown, 1926.*

This eighth annual report which Dr. W. Watkins-Pitchford has made on the work of the Miners' Phthisis Medical Bureau, possesses noteworthy features. The South African Miners' Phthisis Medical Bureau consists of whole time officers, appointed by, and responsible solely to, the government; these peculiarities are favorable to an impartial administration of the Miners' Phthisis Act, and to the accumulation of observations on this important industrial disease.

Compensation to mine workers and their dependents, on account of miners' phthisis and/or tuberculosis, costs the gold mining industry of the Transvaal approximately £800,000 per annum. The actual administration of the Compensation Fund is not undertaken by the Bureau, but all awards are based solely upon the certificates which it issues; these facts indicate the magnitude of the responsibilities imposed upon the Medical Bureau.

The report reviews the work of the Bureau under the various sections of the Act which it is called upon to administer. Among other things these provide for an "initial," or preliminary, examination for fitness of all those who desire to undertake mining work; a "periodical" examination—every six months in the case of Europeans, and every three months in the case of native and colored people—of all who are exposed to the dust of the mines, in order to detect the earliest occurrence of tuberculosis and/or silicosis; a "benefits" examination of any worker who, having ceased mine work, believes that he has contracted miners' phthisis; and post-mortem examinations, in the interests of the dependents of all deceased mine workers in order to ascertain whether miners' phthisis was present as the cause, or a contributory cause, of death.

The term "miner" always implies a European; the native mine workers

are known as "native labourers." The expression "miners' phthisis" is not used by the Bureau; the disease is always referred to as "silicosis," irrespective of whether it is complicated by tuberculosis or not. This simplified terminology might with advantage be adopted in all countries.

Besides a large amount of statistical information for the year ending July 31, 1924, the report contains similar returns for previous years, simultaneously displayed; this method has the recommendation that the reader who wishes to make a comparison is not put to the trouble of consulting previous reports.

The returns for the initial examination show that from 42 to 73 per cent. of the candidates have been rejected in different years; for the year reported on, the rejections were at the rate of 60 per cent. These rejections are almost entirely on the score of "pulmonary defect," in the assessing of which great reliance is placed upon the evidence of a technically satisfactory radiograph. That such stringency has justified itself is shown by the fact that, among the 6,132 European men who have passed the initial examination since 1916 and have become employed as miners, only seven cases of silicosis have occurred; and five out of these seven men had worked as miners elsewhere before coming to the Rand. The incidence of simple tuberculosis on this body of selected men is also somewhat remarkable—only twelve cases since 1916.

More than 22,000 periodic examinations were carried out during the year on 12,159 working miners. The opportunity presented by the periodic examination of all the workers is utilized to ascertain the presence of other than pulmonary diseases, and men are confidentially advised, by letter, of the existence of any condition for which they should seek medical advice. This system of "confidential advice-letters" has been in force since 1916 and has been of material service in improving the general standard of health of the workers. It was necessary to "advise" in this way 2.14 per cent. of the workers in 1917 to 1918, but by the year 1923 to 1924 the proportion had fallen to 0.5 per cent.

The average age of the miners examined was 36 years, 10 months; this figure has risen more or less continuously since 1917 to 1918, when it was 33 years, 10 months. Sixty-four per cent. of the miners were born in South Africa, and 36 per cent. were from overseas. In 1916 to 1917 the latter percentage was 44.

Simple Tuberculosis.—Simple tuberculosis (by which the Bureau means pulmonary tuberculosis without evidence of silicosis) was detected among 12,159 miners to the extent of 90 per 100,000. This is the lowest recorded incidence, and compares favorably with the rate of 321 per 100,000 among the miners in the year 1920 to 1921. It is a compensable disease in the Transvaal if it occurs in a working gold miner. Owing to the periodic examination of all the men while in health, the time of onset of the disease was fairly accurately known in every case. By the end of the first year subsequent to that in which the disease declared itself, 15.9 per cent. (out of 201 cases) had died of their disease; by the end of the sixth subsequent

year, 45.7 per cent. (out of 35 cases) had succumbed.

Simple Silicosis.—Simple silicosis—*i.e.*, silicosis without overt tuberculous complication—developed in 319 of the 12,159 miners periodically examined throughout the year. The rate at which this form of the disease has annually appeared has risen steadily from 1,756 per 100,000, in 1920 to 1921, to 2,652, in the year reported on. Practically all the new cases of silicosis during this period have been in miners who were working before 1916, and who had not therefore passed the initial examination of the Bureau. This rise in the production rate of simple silicosis is claimed to be due to the annually increasing proportion of long-service miners. That it is not due to a "generally enhanced exposure to dangerous dust during recent years" is clearly shown by the fact that none of the 6,132 miners who have become miners after passing the initial examination since 1916 became affected during the year.

The mean duration of employment in the gold mines antecedent to the first appearance of signs of the disease—which Dr. Watkins-Pitchford terms "the average effective period"—was 125 months. This average effective period has gradually lengthened in each year's quota of new cases since the year 1917 to 1918, when it was 113 months.

The subsequent history, year by year, of all cases of simple silicosis which have developed since the year 1917 to 1918 is displayed in tabular form; of 1,652 cases, 43 (2.6 per cent.) had died from silicosis by the end of the first year following that of the first appearance of the disease; by the end of the sixth year, 39 out of 153 cases (25.4 per cent.) had similarly met their death.

The South African Act does not compel miners to take their compensation and leave the mines within three months of the first appearance of the disease; if they continue in the mines, they forfeit the right to the further compensation which is provided for cases as they reach more advanced stages. Despite this inducement to cease work, considerable numbers of silicotic miners remain in the mines. Contrary to general belief, it is found that early retirement from work does not affect the prognosis to any marked extent. In previous reports Dr. Watkins-Pitchford has explained this phenomenon on the grounds that "at least the great majority of cases of simple silicosis owe their earliest detectable development to the presence of an occult tuberculous element," and has pointed out that, given reasonably favorable conditions of living (which are now the rule on the mines), the course which the disease will follow is inherent in the case from the outset.

Tuberculosis with Silicosis.—Tuberculosis with silicosis is compensated for on a higher scale by the Act, but, like simple tuberculosis, calls for the immediate and *compulsory* retirement of the mine worker. Only twenty cases of this condition developed among 12,159 miners during the year, giving a rate of 164 per 100,000. Before the year 1919 to 1920 a rate of over 800 was annually recorded, a fact which indicates great improvement in the hygienic circumstances of the industry.

In a previous report (for 1921 to 1922) reasons were given for dividing cases of tuberculosis with silicosis into two classes. In the first the condition is termed "tuberculo-silicosis," and is characterized by the appearance of signs of overt tuberculosis in a miner who was previously the subject of simple silicosis. The second class comprises those cases in which the signs of overt pulmonary tuberculosis appear either just before or simultaneously with those of silicosis; this condition is referred to as "silico-tuberculosis." The records show that, in earlier years, the former of these conditions (tuberculo-silicosis) was of more frequent occurrence than the latter; now, however, the position has been reversed, and silico-tuberculosis is of much more frequent occurrence than tuberculo-silicosis.

The subsequent history of all the cases of both forms of tuberculosis with silicosis is given; in the two classes combined, the disease proved fatal in 118 out of 320 cases (36.8 per cent.) by the end of the first year after that of certification; by the end of the sixth year, 99 of 116 cases (85.3 per cent.) were dead of their disease. The contrast in the matter of prognosis between the three diseases which are compensable under the Act (simple tuberculosis, simple silicosis, and tuberculosis with silicosis) is striking.

An observation emphasizes the importance of recourse to radiography in every case before deciding on the presence of silicosis—the Bureau examined, during the year, 541 exminers who had been compensated for silicosis prior to the establishing of the Bureau in 1916. These men claimed further compensation, but the Bureau was unable to detect any evidences either of silicosis or of tuberculosis in 225 (41.5 per cent.) of these beneficiaries. Many of the original claims had been decided without resort to radiography, a fact which might be recommended for careful consideration by those now responsible for administering the Refractories Industries Compensation Fund in Great Britain.

Postmortem examinations were carried out on 122 miners; in fifty instances (41 per cent.) silicosis was responsible for, or contributory to, the death; none of the stigmas of silicosis could be discovered in the lungs of twenty-five of the deceased miners, despite the fact that sixteen of them had been engaged in underground work for longer than six years.

The average number of natives working on the mines during the year 1923 to 1924 was 178,000. Simple tuberculosis was found at the rate of 328 per 100,000 (as contrasted with 90 for the European miners); cases of simple silicosis were found at the rate of 66 per 100,000 (as contrasted with 2,652 among the miners); and tuberculosis with silicosis at a rate of 175 (as compared with a rate of 164 for the miners). The explanation of the discrepancies in the incidence of simple tuberculosis and of simple silicosis among the natives and the Europeans, respectively, has been given in former reports; the more important factors producing the relative excess of tuberculosis among the natives are their low power of resistance to the infection, and the increased risks of exposure to infection which result from their communal life in somewhat crowded compounds; the relative infrequency of

silicosis among them is due to the fact that the great majority of them work for only six or nine months at a time, the periods of work being separated by long "holidays" at their kraals.

The returns for all years since 1916 indicate a fall in prevalence rate for simple tuberculosis among the natives in eight years from 576 to 328 per 100,000. This decline may be largely attributed to the special legislation which, since 1916, has required regular examination of the entire labor force at short intervals. Among the European miners, however, the decline in this rate during the same period has been much more marked—from 259 to 90.

The South African native has been held to be constitutionally less liable to contract silicosis than the white man when subjected to similar exposures to quartz dust; but after 1,017 natives, who had worked in the mines continuously for longer than five years, had been submitted to radiographic and clinical examinations, Dr. Watkins-Pitchford concluded "that, under similar conditions and for similar periods of employment, the Native is neither less nor more susceptible to silicosis than the European."

A matter of importance was disclosed during this special investigation of long-service native laborers; 16 cases of simple tuberculosis and 34 of tuberculosis with silicosis, the existence of none of which had been previously suspected by the mine medical officers, were found. Dr. Watkins-Pitchford remarks that "this unsuspected reservoir of infection may be reasonably credited with the responsibility of having originated many of the 878 other cases of tuberculosis . . . . which developed during the year among the European miners and Native labourers; and, moreover, if my frequently expressed opinion regarding the *rôle* of a tuberculous infection in the development of simple silicosis is well founded, the same concealed agency may have been the source of a considerable proportion of the 438 fresh cases of the latter disease."

The present methods adopted by the mine medical officers for the detection of tuberculosis among the natives possess weaknesses; and the main body of the report concludes by advocating the creation of "a small but energetic organization . . . . for the detection of tuberculosis amongst Native recruits and employed labourers." Radioscopy might with advantage be largely resorted to. As each mine medical officer is responsible, among other things, for the examination of from 5,000 to 10,000 natives at intervals of three months, some such "special organization" is indeed called for.

Among the schedules to the report are detailed returns giving the age, country of birth, and industrial history of every case of tuberculosis and silicosis which originated among the miners during the year.

MINERS' PHTHISIS ON THE WIT WATERSRAND AND THE CONTROL OF AIR-BORNE DUST. *A. Mavrogordato. Tr. Inst. Min. Eng., Feb., 1926, vol 70.*

The factors which make a dust phthisis producing are: *the presence of free silica* (SiO_2); *the size of the particles* —even when all visible dust has been

removed the condition may still be dangerous, since particles of 5 microns and less produce the disease; and *concentration*—heavy concentrations may produce the disease in two years while weaker concentrations may take ten years. The effect is cumulative. Dust may produce disablement *per se* or may only pave the way to tuberculosis of the lungs.

Prevention may be dealt with under three headings.

1. What may be regarded as a safe level in the concentration of air borne dust? "Nobody knows." In 1902 there was a prevalence of miners' phthisis of about 25 to 30 per cent. related to a dust concentration of 150 mg. per cubic foot of air. At the present time the dust concentration has been reduced to 2 mg. per cubic foot of air and phthisis is still being produced.

2. What factors are chiefly concerned in the production of dangerous dust? Drilling appears to be more dangerous than blasting, and drilling without water and by hand the most dangerous. Dead ends require careful watching on account of the difficulty of obtaining sufficient ventilation.

3. What are the most hopeful methods of dust control? Ventilation, use of water, and use of dust abstractors are the three methods considered. Air should be delivered to the working place containing not more than 0.5 mg. of dust per cubic foot of air. Blasting should take place not more than once in every twenty-four hours. No person should be employed underground for more than forty-eight hours in any consecutive seven days. All machines should be water fed. Water blasts should be used for fifteen minutes in the working place after every blasting and the roof and sides should be wetted again before the men start work. The working place must be kept wet throughout the shift. Dust abstractors may either clean the air before it is delivered to the working place or be attached to the drilling machines.

Dr. Haldane in discussing the paper said that free silica must be either nearly pure or associated with other insoluble crystalline minerals in order that it should produce the disease miners' phthisis. In England shale dust has been used for dusting the roadways without any ill effects being noticed and the death rate for phthisis was low for coal miners. In some places, especially the Rand, the dust is very dangerous; in other places, such as the Kolar gold fields of India and the Cripple Creek mines of America, no phthisis is found. There appears to be present in some silica containing dust an antidote which prevents the ill effects of the silica. Coal dust seems to act in this way.

Yandell Henderson (Yale) said that American experience had confirmed the findings of Dr. Haldane in England and Dr. Mavrogordato in South Africa and that he wished to express the great debt which everyone interested in the welfare of miners owed to these workers. Unfortunately in the production of miners' phthisis it is the particles whose size corresponds to that of bacteria which are the causative agents. These particles are so small and so free from weight that they float indefinitely in the air and cannot be shot down by jets of water. Amelioration of the condition probably lies in developing methods of dust

abstraction similar to those used in the cutlery industry.—T. L. L.

MINERS' PHTHISIS. *E. H. Kettle. So. African Med. Rec., Dec. 26, 1925, vol. 23, p. 553.*

SPUTUM AND THE GOLD MINER. *W. Watkins-Pitchford. Hortors, Ltd., Johannesburg.*

The author in an interesting semi-popular address stresses the importance of exposure to tuberculous infection for those having an occupational silica dust risk, such as gold miners in South Africa. He holds the opinion that the great majority of persons with apparently simple silicosis would not have developed their silicosis had they not become infected by the bacillus of tuberculosis. This conclusion that infection by tubercle precipitates a previously latent silicotic condition is one of great importance and one at which Dr. Watkins-Pitchford has been slowly and certainly arriving through many years' experience. He points out that in a moderately advanced case of pulmonary tuberculosis the patient expectorates during twenty-four hours from one thousand million to five thousand million tubercle bacilli. He therefore holds that the elimination, from among those exposed to a silica risk, of all sufferers from tuberculosis is at least as important as the reduction of the silica risk to the least possible degree. Fortunately the incidence of pulmonary tuberculosis, although still high among native labor, has fallen from 5.8 per thousand in 1916 to 3.3 per thousand in 1924; while the fall among white miners has been from 2.6 in 1917 to 0.9 in 1924. Carriers of the tubercle bacillus must be detected, isolated, and removed from the mines where conditions of spreading infection either underground, in the hoists, or, for native labor, in the sleeping quarters of the compounds, are numerous. Aid is asked from the officials of the dust sampling department and dust inspectors in the mines, by giving confidential information about individuals suffering with cough, and by collecting samples of sputum.—E. L. C.

STUDIES IN INDUSTRIAL HYGIENE, NO. 2. AN INVESTIGATION CONCERNING VENTILATION AND THE SANDSTONE DUST PRESENT IN THE AIR OF CERTAIN SEWER TUNNELS UNDER CONSTRUCTION AT NORTH SHORE, AND IN OTHER SANDSTONE WORKINGS. *C. Badham. Rep. Dir.-Gen. Pub. Health, New South Wales, for 1924, Section I-C, Indust. Hyg., pp. 52–64. Sydney, 1926.*

A description is given of work in sandstone tunnels in the construction of sewers. Much sandstone dust is generated, and estimations by means of Owens' dust counter are given under varying conditions. The conclusion is arrived at that there is considerable risk of silicosis.

Recommendations are made that water blast should be used during and after firing explosives used to break up rock, and that the miners should not return to work for at least an hour after firing. The suggestion is put forward that 200 particles of dust per cubic centimeter should be accepted as the standard not to be exceeded where work is being carried on.

The method described for ventilating tunnels is of interest. It is by exhaust rather than by blowing air into the

workings. The exhaust is created by using compressed air on the ejector principle, the opening of the exhaust pipe being brought as close as is reasonably possible to the working face.

This report takes its interest chiefly from the details given of dust estimations.—E. L. C.

STUDIES IN INDUSTRIAL HYGIENE, NO. 4. AN INVESTIGATION CONCERNING THE WORKING CONDITIONS AND THE HEALTH OF QUARRYMEN IN CERTAIN GOVERNMENT QUARRIES IN N.S.W. *C. Badham assisted by C. F. Assheton. Rep. Dir.-Gen. Pub. Health, New South Wales, for 1924, Section I-C, Indust. Hyg., pp. 69-75. Sydney, 1926.*

The author investigated the clinical results, as estimated by radiography, of exposure to basalt and dolorite dusts which contain little, if any, free silica. The men examined were employed in crusher houses where the exposure to dust was excessive. Out of fifteen men examined, only one showed signs of fibrosis. Hence the conclusion is drawn that danger from dust of basalt and dolorite is almost negligible. Details are given of the analyses of the stones, of the type of work done, and of the men who were submitted to examination.—E. L. C.

STUDIES IN INDUSTRIAL HYGIENE, NO. 5. INVESTIGATION INTO THE SANDSTONE DUST HAZARD AMONG MINERS, QUARRYMEN AND STONEMASONS IN NEW SOUTH WALES. *C. Badham assisted by C. F. Assheton. Rep. Dir.-Gen. Pub. Health, New South Wales, for 1924, Section I-C, Indust. Hyg., pp. 76–89. Sydney, 1926.*

The known high mortality among stonemasons, miners, and quarrymen exposed to silica dust led to this investigation. No definite statistics are quoted, but an example is given of twenty men of whom at the end of four years there were only two survivors—patients at Waterfall Sanatorium, where they died. A discussion is given of dust examinations by particulate counting and by gravimetric sampling. Reasons are given by the authors why they prefer to use Owens' dust sampler rather than any other method in their investigations. A description is presented of the activities investigated in New South Wales and of the personnel; preventive measures are suggested, which include efforts to keep the dust within a reasonable limit—that suggested is 200 particles of dust, 2 microns or less in diameter, per cubic centimeter of air. A large number of dust counts are given in five tables. The investigators consider that the site of a stonemason's yard should be carefully chosen so that it can be open as much as possible to breezes and not be placed under the shadow of tall buildings.

The institution of periodic medical examinations, with radiography of men exposed to the risk from silica dust, is strongly recommended. The provisions of the Silicosis Act, it is stated, will probably be extended to these workers within a year.—E. L. C.

THE EFFECTS OF THE INHALATION OF COAL AND STONE DUSTS ON THE LUNGS OF PIT PONIES. *F. Haynes. Jour. Hyg., Feb., 1926, vol. 25, pp. 94–108.*

Stone dusting of roadways in coal mines is now in general use in order to

minimize risk of explosion. In order to gain information as to the possibility that this dust may create a danger to health, specimens from the lungs of fifty-seven pit ponies which died or were destroyed after years of work were examined. All specimens were not in good preservation when received and a curious statistical method of arriving at a "work-dust factor" is used which can hardly be accepted as valid. Leaving these points on one side, evidence is presented that dust accumulated in the lungs of the ponies during the first two years of exposure, after which elimination and absorption became equal, but that no pulmonary fibrosis resulted. The dust seemed to accumulate first around the blood vessels, second around the bronchi, and third in the deep layers of the pleura where the deposition was greatest, and from which the dust was eliminated *via* the bronchi and the lymphatics.—E. L. C.

SILICOSIS: A RÉSUMÉ OF THE LITERATURE ARRANGED FOR THE USE OF THE PHYSICIANS IN THE STATE OF NEW YORK. *R. S. McBirney. N. Y. State Dept. Labor, Bur. Indust. Hyg., Special Bull., 1925, pp. 68.*

The purpose of this résumé is stated in the foreword as follows:

> Anticipating legislation in the near future with a view to affording compensation to workers in industry suffering from silicosis this bulletin is submitted for the convenience of those physicians in New York State who may be interested.
>
> Silicosis has been the cause of a number of deaths among certain groups of industrial workers, and no doubt has been unrecognized and entered as fibroid phthisis, pulmonary tuberculosis and bronchitis.
>
> In compiling this resume of the literature of silicosis the aim was to make only those references from medical literature in detail which are likely to be of assistance to the general practitioner.
>
> There seems to be ample evidence that as a result of a careful study of silicosis the number of cases to be so diagnosed will increase.

This booklet is supplemented by an unusually complete and well-prepared bibliography. While it has been intentionally made into the practical handbook style, it is too useful to be limited to New York or to any other single state. Copies can be obtained gratis by writing to the Director, Bureau of Industrial Hygiene, New York State Department of Labor, 124 East 28th Street, New York City.—P. D.

SILICOSIS: ITS RELATION TO TUBERCULOSIS. *A. R. Riddell. Pub. Health Jour., Jan., 1926, vol. 17, pp. 1–8.*

SILICOSIS IN NEW YORK STATE. A STUDY OF FIFTEEN CASES OF SILICOSIS FROM THE STANDPOINT OF COMPENSATION. *N. Y. State Dept. Labor, Bur. Indust. Hyg. Bull., 1926, pp. 29.*

This is a brief, well-prepared bulletin of case reports with X-ray plates of (*a*) silicosis, (*b*) tuberculosis, (*c*) siderosis.

In the foreword the author remarks that some of the reasons why cases of pneumonokoniosis are often overlooked in New York State are because the physician either "fails to get an adequate history of exposure to dust, or because of the fact that he is unfamiliar with the industries in which the several dusts play a part;" and

again because "no X-ray picture has been taken."

Judging from the very limited data on the prevalence of pneumonokoniosis in the United States, the foregoing remarks could be applied with equal force to the rest of the country.—P. D.

ABSTRACT OF THE LITERATURE OF INDUSTRIAL HYGIENE

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GENERAL

NUREMBERG INDUSTRIES. *Heydrich. Zentralbl. f. Gewerbehyg., Feb., 1926, N. S. vol. 3, pp. 28–32.*

Much of this lecture is devoted to a description of factory plants and manufacturing methods. The following with regard to hygiene is here of interest.

In the brush factories, owing to the danger of anthrax infection from the hair and bristles, most of which are imported, the law provides for a thorough disinfection of all the raw material before it is worked on. This is accomplished by means of a stream of steam driven under pressure through the "kettle" containing the material, which must be kept at a temperature of 103°C. throughout the operation. The workers in charge of disinfection are well protected with cap and clothing and have their own washing facilities.

The white bristles are not treated as above but are boiled for fifteen minutes in a 2 per cent. solution of permanganate of potassium contained in wooden vats.

The brush makers are provided with adequate washing facilities, warm water, soap, and towel. Eating is forbidden in the workrooms during working hours, on account of the dust.

In the oleomargarine factories, like-

wise, great care is taken in the matter of cleanliness. Finely equipped lunch and bath rooms are provided; also washing and drying rooms for the clothing.—A. W. N.

HEALTH OF MERCHANT SEAMEN. *World's Health, June, 1926, pp. 232–273.*

This number is devoted to a series of semipopular articles dealing with merchant seamen contributed by the International Labour Office, British Ministry of Health, United States Public Health Service, League of Red Cross Societies, Fleet Surgeon W. E. Home, and Dr. H. F. Schaeffer of France. Although considerable improvement has taken place in the last twenty-five years in the seaman's lot, his life remains far from ideal; at sea his quarters are overcrowded, his sanitation is bad, his accident rate and tuberculosis mortality are high, while medical services are mostly wanting; in port he lacks opportunities for healthy leisure and contracts venereal diseases. Only by international agreement and collaboration can permanent betterment be attained.—E. L. C.

SYSTEMIC OCCUPATIONAL DISEASES: OCCURRENCE, TREATMENT, AND PREVENTION

CENTRAL NERVOUS SYSTEM

CEREBRAL HEMORRHAGE, CEREBRAL AFFECTION, OR INDUSTRIAL POISONING? *A. Hopmann. Zentralbl. f. Gewerbehyg., Jan., 1926, N.S. vol. 3, pp. 13–14.*

Every one of the older factory physicians has had to ask himself at some time, "Is this a case of cerebral hemorrhage, cerebral affection, or industrial poisoning?" The symptoms can resemble each other. A physician may easily be confronted with this question when called on to treat in the chemical industry a worker who has suddenly become unconscious with periodic convulsions. Dr. Hopmann, who is head physician at the Policlinic of the J. G. Dyeworks at Leverkusen, describes in detail two cases that had come under his observation. In both cases the patients were factory workers and were unconscious and in convulsions when the physician was called. Also, in both cases the possibility of industrial poisoning existed and the physician first assumed it so to be. In one case subsequent symptoms of partial paralysis gave indication of cerebral disturbance. Both patients died within two days and autopsies revealed the cause as cerebral hemorrhage.

After an experience of twenty-five years in the dye works, Dr. Hopmann maintains that, with the exception of a few scattering cases of acute poisoning or of bladder trouble, positive cases of chronic poisoning have practically never appeared. Further, in every case when an employee has died suddenly or after a short illness, and when the cause seemed doubtful, he has deemed it advisable to have an autopsy performed. These have shown without exception pathologic changes in the blood vessels or in the substance of the brain.

In one department of the dye works,

cadmium has been one of the by-products since 1909, and since 1921 cadmium dyes have been manufactured. During this time there has been neither a case of acute nor of chronic poisoning by cadmium established. Other factories have had like experience. Experiments with animals have demonstrated, however, that cadmium salts administered *per os* produce symptoms of acute or chronic poisoning, and that cadmium vapors can cause severe and even fatal poisoning. It is therefore necessary to protect workers with cadmium against the dangers of either dust or vapors. Cleanliness and ventilation are essential.—A. W. N.

CIRCULATORY SYSTEM

STATISTICAL ASPECTS OF THE PROBLEM OF ORGANIC HEART DISEASE. *L. I. Dublin. N. Y. State Jour. Med., 1925, vol. 25, pp. 986–990.*

PROBLEM OF ORGANIC HEART DISEASE. *U. S. Month. Labor Rev., Feb., 1926, vol. 22, p. 437.*

"Heart disease in its various forms stands first in the order of causes of death." Mortality rates from this disease during the main age period of life are for colored workers twice those for white workers at the corresponding ages. Among industrial policyholders of the Metropolitan Life Insurance Company the death rates per 100,000 for organic heart diseases in 1923 were 113.6 for white males, 122.1 for white females, 190.8 for colored males, and 217.4 for colored females for all ages, 1 year and over, while between the ages of 35 and 44, and 45 and 54, the rates were, respectively, for white males 86.6 and 253.3, for white females 70.7 and 184.9, for colored males 180.3 and 424.6, and for colored females 184.7 and 470.4 per 100,000 of population.

Dr. Dublin emphasizes the fact that the merest beginning only has been made in the collection of information on the incidence of heart disease in the community and on its morbidity. He urges a more systematic and complete study of the cases and a more general compilation and analysis of the records.—B. A.

POISONOUS HAZARDS AND THEIR EFFECTS: GASES, CHEMICALS, ETC.

SUGGESTIONS FOR THE ADMINISTRATION OF FIRST AID TO PERSONS SUFFERING FROM EXPOSURE TO CHEMICALS OR GASES. *Issued by the Medical Research Division, Edgewood Arsenal, Md. Chem. Warfare, June 15, 1926, vol. 12, pp. 10–16.*

INDUSTRIAL GASES. ANALYSIS OF FACTORY INSPECTION REPORTS, 1920–1922: III. *Internat. Labour Rev., April, 1926, vol. 13, pp. 555–563.*

Austria.—Carbon monoxide poisoning occurred from an ineffectively ventilated forge flame; from escape of town gas in a workshop; from entering the gas main of a blast furnace; from an open wood fire; and from vat cleaning in a spirit factory.

Germany.—Carbon monoxide poisoning is reported from cleaning blast furnaces; from sleeping beneath a drying oven in an iron foundry; from escape of blast furnace gas; from re-

ducing zinc oxide by the electro-metallurgical process, but the exact causation of these cases is doubtful; from cleaning washers and other employment in gas works; from waste gas purifiers; from leaky gas engines; from Cowper regenerators; in a formic acid factory; from contaminated air in a shaft; from fumes from a glass furnace; from work on smelting ovens; from entering a slag bunker after a fire; from hot slag heaps; from incomplete combustion of high explosives; from well sinking; from lime kiln gas; from glowing boiler cinders; from making carborundum in electric furnaces; from making lighting gas and producer gas; from entering a gasometer; from coffee roasting; in a shellfish drying works; in a cold storage plant; from hot metal surfaces; and from stove fumes.

Other cases of gas poisoning resulted from entering a retort at a tar distilling works; from nitrogen in a cold storage plant; from phosgene; and from carbon bisulphide in rubber factories.

Great Britain.—Carbon monoxide caused poisoning at blast furnaces in charging cupolas, in repairing cupolas or flues, in flue cleaning, and from gas leakages; at making producer gas in repair work, in cleaning, and in charging and stoking; at gas works; at factories using coal gas; at cleaning out an ash receiver; at lime kilns; and from the use of coke fires.

Cases of carbon dioxide poisoning occurred, two in breweries.

Netherlands.—Poisoning from carbon monoxide occurred from incomplete combustion in a shipyard, at a central heating installation, and at a pastry cook's shop; in lime burning; and also from gas escaping from a syrup tank, at gas works, in an oil gas factory, and in a shoe factory.

Switzerland.—Cases of poisoning by phosgene and carbon monoxide were reported.—E. L. C.

EFFECTS OF AMMONIA GAS AND SAFE LIMIT OF GAS IN THE ATMOSPHERE OF WORK PLACES. *U. S. Month. Labor Rev., Jan., 1926, vol. 22, pp. 182–184.*

This is a compilation of information from Bulletin 100 of the United States Bureau of Labor Statistics and "Industrial Poisoning in the United States," by Dr. Alice Hamilton.—M. C. S.

ARSENIC. ANALYSIS OF FACTORY INSPECTION REPORTS, 1920–1922: III. *Internat. Labour Rev., April, 1926, vol. 13, pp. 549–550.*

Germany.—Poisoning by arseniuretted hydrogen occurred from using arsenious acid indoors for blackening pieces of brass; from placing iron and brass ash bins into a mordant composed of 1 per cent. of arsenic, 2 per cent. of hydrochloric acid, and equal parts of water and iron sulphate, and then plunging a stick of zinc into the mordant in order to cover the bins with a deposit of arsenic; from precipitating copper from solution by means of scrap iron covered with zinc; from reducing a nitrous compound by powdered zinc in an alkaline solution; and from pouring sulphuric acid into a zinc bucket. Paris green in paints caused cases of sickness and also of local dermatitis. Arsenic poisoning also resulted from making sodium arsenate by roasting a mixture of soda and arsenious acid in open furnaces.

Great Britain.—Arsenical dust

caused poisoning in making sheep dip; in repairing the stack of a tin calcining furnace; and in cleaning flues of a nickel and cobalt refinery. Toxic jaundice due to arseniuretted hydrogen occurred in a zinc sulphate factory.—E. L. C.

CHROME. ANALYSIS OF FACTORY INSPECTION REPORTS, 1920–1922: III. *Internat. Labour Rev., April, 1926, vol. 13, pp. 551–555.*

Austria.—Tannery workers developed ulcers on the right foot and inflammation of the right hand.

Germany.—Skin lesions occurred on workers in several alkaline chromate factories, with ulcers on exposed parts, eczema, and eye irritation. The workers were exposed to dust and generally had perforation of the nasal septum. Similar troubles originated from chrome lye and potassium bichromate. In one group of 210 workers, the septum was perforated in about 13 per cent. Swabbing the nose with dilute aluminium acetate, and then covering with zinc ointment and balsam of Peru is said to prevent perforation. Skin troubles were reported from chrome tanning; from using chromates in fur dyeing; from photo-engraving; from chromolithography; from the use of bichromates and nitric acid to dye combs; in a ferrochrome factory, and in a paint factory.

Great Britain.—During the three years reviewed, 197 cases of chrome ulceration were reported, of which 100 occurred in bichromate manufacture, 57 in dyeing and finishing, and 32 in the use of sodium or potassium bichromate. Cases occur much earlier in the manufacture than in the use of chromates, about 50 per cent. of the cases as against almost 25 per cent. occurring in the first twelve months of employment. The greater the care taken through medical supervision and by minimizing risk, the fewer and less serious were the cases.

Netherlands.—A case of eczema originated in photo-engraving from covering glass plates with chromated gelatin containing 10 per cent. of potassium bichromate.—E. L. C.

RECENT OBSERVATIONS CONCERNING INDUSTRIAL INJURIES BY HYDROCARBONS. *Floret. Zentralbl. f. Gewerbehyg., Jan., 1926, N.S. vol. 3, pp. 7–10.*

Attention is called to the fact that while acetylene is generally regarded as comparatively harmless, yet impurities may be present in the form of hydrogen sulphide or of the highly poisonous phosphoretted hydrogen gas. These impurities in the form of organic combinations of sulphur or phosphorus are contained in the calcium carbide from which acetylene is derived. The greatest number of acetylene poisonings are due to the presence of phosphoretted hydrogen. This gas, unlike arsenic hydride, causes no perceptible injuries or alterations to the blood. It operates chiefly as injurious and paralyzing to the nerve centers. The symptoms are general prostration and muscular weakness, disturbance of breathing and heart functions, then cramps and unconsciousness. The course of attack is often rapid and fatal. A specific case of acetylene poisoning is described in detail.

The typical skin disease known as "chloracne" is probably traceable to chlorinated hydrocarbons. It is usually found among people employed

in handling chlorine in some form, presupposing the goods to have come in contact with tar in some form, whereby the formation is possible of volatile chlorinated tar products. Pure chlorine will not cause acne. A group of cases consisting of twenty-one workers is described in detail.

Benzine causes toxic manifestations similar to those produced by benzol, though the injuries are usually less severe and persistent. Owing to the extended use of benzine, cases of poisoning—acute, chronic, and even fatal—occur rather frequently. Benzine, like benzol, belongs to the true nerve poisons, and has no detectable action on the blood. It often remains for some time unabsorbed in the stomach, hence flushing of the stomach is indicated and should be continued for a long period. By experimenting with animals it has been learned that in cases of quick absorption extended necrotic and inflammatory processes take place in the lungs. This is probably due to the fact that the benzine is eliminated through the lungs. Detailed description is given of two cases of benzine poisoning, one of which proved fatal. Two fatal cases of benzol poisoning are also described in detail, together with the results of the postmortem examinations. Curious instances are cited of the beneficial results of working with benzol on the part of a group of women during the war. A distinctly favorable stimulus seems to have been exerted on the entire organism, resulting in a conspicuous state of good health and increase in bodily weight, in spite of difficult nutrition. This experience is in striking contrast to the condition of other workers in the same factory, though not employed in the benzol room.—A. W. N.

MERCURY. ANALYSIS OF FACTORY INSPECTION REPORTS, 1920–1922: III. *Internat. Labour Rev., April, 1926, vol. 13, pp. 541–546.*

Austria.—Serious gingivitis and loss of teeth occurred among rabbit hair cutters working in a cellar round a stove. Poisoning was also reported in a large hat factory. A useful list of instructions for controlling the use of mercury solution on rabbit skins, issued in 1921, is given in detail. Risk is also reported while making incandescent lamps from glass mercury pumps, and from fulminate of mercury in the manufacture of detonating caps.

Belgium.—During medical inspections in the rabbit hair cutting industry out of 1,589 men examined 7.9 per cent. were found with clear symptoms of poisoning, and out of 5,802 women examined, 4.7 per cent.

France.—Only four cases were notified in 1921—from a rabbit hair factory in Paris—and seven in 1922.

Germany.—Cases of mercurialism came under notice in Schleswig due to repairing electric meters, and in the states of Baden and Hesse and in Berlin from making and repairing current rectifiers. Others occurred among thermometer makers. One case resulted from preparing corrosive sublimate solution for impregnating wood; while signs of absorption were found among carrotters of rabbit hair.

Great Britain.—The amount of mercury found in the air of a clean ther-

mometer factory allowed a worker to inhale 18.5 grains in a year; cases of mercurialism occurred in this industry and also from testing electric meters, making corrosive sublimate, cleaning electrodes, and making wireless apparatus.

Netherlands.—A case occurred in making metallic filament lamps and 10 mg. of mercury were found in 3 liters of urine.

Switzerland.—A case was reported due to mercury vapor released in tempering saw blades, and another in an alcohol factory.—E. L. C.

PHOSPHORUS. ANALYSIS OF FACTORY INSPECTION REPORTS, 1920–1922: III. *Internat. Labour Rev., April, 1926, vol. 13, pp. 550–551.*

Austria.—A case of necrosis of the jaw with kidney and liver trouble occurred in a factory where only red phosphorus was used.

Germany.—Three cases of necrosis were reported from one phosphorus factory.

Great Britain.—A dipper using phosphorus sesquisulphide developed ulcers on the tongue and gums which rapidly cleared up under treatment.—E. L. C.

ZINC. ANALYSIS OF FACTORY INSPECTION REPORTS, 1920–1922: III. *Internat. Labour Rev., April, 1926, vol. 13, pp. 546–549.*

Austria.—A case or so of brassfounders' ague was reported each year, usually in metal foundries, but in one case from soldering galvanized iron, and in another from making zinc architectural ornaments.

Germany.—Cases of zinc ague occurred from soldering galvanized utensils, from using a blowtorch on galvanized steel ship plates, and in reducing zinc oxide by electrolysis. Similar symptoms in a copper rolling mill, ascribed to fine copper dust, led to the deduction that all heavy metals under certain conditions can cause "brassfounders'" ague.

Great Britain.—Cases occurred while cutting galvanized plates from light craft by use of the oxyacetylene flame. Amounts of zinc were found in the air which represented a daily dose per worker equivalent to from 12 to 25 mg. of zinc.

Netherlands.—Cases came under notice in this country, one of which was due to using an oxyacetylene flame in soldering copper. Attacks in brass smelting varied in severity with the amount of zinc in the product; in only one case was zinc detected in the urine.—E. L. C.

VARIOUS METALS. ANALYSIS OF FACTORY INSPECTION REPORTS, 1920–1922: III. *Internat. Labour Rev., April, 1926, vol. 13, p. 555.*

Two cases of neurosis ascribed to manganese dioxide were notified in Thuringia, and two cases of antimony poisoning from Hamburg.—E. L. C.

OCCUPATIONAL DISEASE OCCURRING IN A BUFFER WORKING ON BRITANNIA METAL. *U. S. Month. Labor Rev., Jan., 1926, vol. 22, pp. 184–185.*

The material presented here, from Kober and Hayhurst's "Industrial Health" and W. Gilman Thompson's "The Occupational Diseases," relates to the general effects of fatigue and to the effects of antimony which constitutes 8 to 10 per cent. of Britannia

metal and seems to be the dangerous constituent. The information was compiled in answer to an inquiry regarding a case of neuritis which was believed to have been caused by the fatigue of buffing complicated possibly by the effects of Britannia metal.—M. C. S.

OCCUPATIONAL AFFECTIONS OF THE SKIN AND SPECIAL SENSES

Occupational Deafness. *D. Ranken. Jour. State Med., June, 1926, vol. 34, pp. 318–322.*

Noise is the greatest originator of occupational deafness. The pitch of the sound determines whether the deafness is most marked for low, medium, or high notes, due to wearing out of the portion of the cochlea concerned. Deafness may also result from rupture of the drum, through explosions or pressure; gunfire and rapid aeroplane descents are instances. Any occupational influences which cause diseases of the nasopharynx, such as dusts and noxious gases, may cause deafness by involving the eustachian tube. Prevention is to be sought from minimizing noises, protecting the ear drum, medical selection and periodic examination, and from shortening shifts at noisy work.—E. L. C.

The Treatment of Lime Burns of the Cornea by 10 Per Cent. Neutral Ammonium Tartrate. *E. Wolff. Brit. Jour. Ophth., April, 1926, vol. 10, pp. 196–197.*

Lime Burns of the Eye. *Lancet, June 19, 1926, vol. 1, p. 1212.*

Attention is drawn to a successful method of treatment for removing corneal opacities resulting from deposition of particles of calcium carbonate. It consists in daily irrigation for a period of fifteen minutes with a solution of 10 per cent. neutral ammonium tartrate. The calcium carbonate is converted into calcium tartrate, which is slowly washed away, when the opacity is removed.—E. L. C.

Eye Irritations of Spinners in Artificial Silk Factories. A Contribution to Hydrogen Sulphide Poisoning. *Rodenacker. Zentralbl. f. Gewerbehyg., Jan., 1926, N.S. vol. 3, pp. 20–23.*

Among the spinners working with viscous substances in the artificial silk factories, there appears at times a troublesome and painful inflammation of the conjunctiva. In newly established factories many such cases are observed, but as the inflammation often disappears in a short time they are more or less forgotten by the physician. Now and again the question as to the cause comes up for discussion. These cases have been variously attributed to hydrogen sulphide and organic sulphur combinations, to sulphurous acids, to hydrogen sulphide in combination with arsenic combinations and chlorine, but most German investigators now have agreed that hydrogen sulphide alone is the cause.

Dr. Rodenacker considers this explanation plainly confirmed by chemical reactions for which he presents a series of formulae. Experiments and tests made about the spinning machines and equipment further verify this belief. Careful experiments with hydrogen sulphide on animals and

human beings have shown an increase of lacrimal, nasal, and salivary secretions. Dr. Rodenacker considers the disturbance something more than a simple irritation of the mucous membrane, and the effect of the gas as not merely local but extending to the entire organism.

An instance is cited when seventy-nine patients suffering from conjunctival inflammation were under treatment. They complained of darting pains in the eyes, a feeling of sand, photophobia, tears, halo and rings around lights. The eyes were red, the lids swollen, the follicle velvet-like and conspicuous; lacrimal and nasal secretions were increased and the voice was husky. After one or two days' treatment, consisting of hot poultices of boric solution, the irritation was entirely relieved without any injurious after effects. The use of cocaine, often recommended, was avoided. Susceptibility to hydrogen sulphide was found to be variable, though within narrow limits, in different individuals.

Among the seventy-nine patients, two cases of defective refraction were found. The hypermetropic or the astigmatic eye is more vulnerable to outside injury than the emmetropic eye.

Another interesting instance is cited of twenty-nine workers in a gold leaf cutting room. Here the cause of the inflammation was found to be purely mechanical—namely, minute particles of paper and gold leaf in the dust, producing refraction anomaly.

From experience with patients and experiments on animals, it is declared that the sensitiveness produced by hydrogen sulphide does not decrease by becoming habitual. On the contrary, it steadily increases. Susceptible workers leave the factory and the gradual disappearance of the ailment is due to the elimination of the susceptible. No correlation between the poison and the organism could be recognized. Hydrogen sulphide cannot be a nerve poison, notwithstanding the fact it may cause convulsions. These are the result of inner suffocation due to the replacement by sulphur combinations of iron combinations in the cells, whereby vesicular respiration is apoplectically extinguished. Hydrogen sulphide acts after the manner of cyanides.

In one case, prompt relief was given the patient by the intravenous administration of colloidal iron, the injection regenerating the locally poisoned vesicular breathing ferment. Similar results were obtained in experiments on animals. The injury to the mucous membrane by the gas is a local arrest of oxidation, not a simple irritation.

Experiments have verified the well-grounded theory of the catalytic importance of iron in vesicular respiration.—A. W. N.

OCCURRENCE AND PREVENTION OF INDUSTRIAL ACCIDENTS

COKE-OVEN ACCIDENTS IN THE UNITED STATES DURING THE CALENDAR YEAR 1924. *W. W. Adams. U. S. Bur. Mines, Tech. Paper 388, 1925, pp. 38.*

Accidents to persons engaged in

the manufacture of coke during 1924 resulted in a lower death rate and a lower injury rate than in any other year on record. The death rate was 1.16 per thousand men employed (full time or 300-day workers) and the injury rate was 79.54. Next to 1924, the lowest accident rates were those for 1915, both the beehive and by-product coking plants sharing the reduction in rates.

In 1924, reports showed that 20,451 men were employed, averaging 303 workdays per man; accidents were responsible for twenty-four deaths and 1,645 injuries, each injury causing disability beyond the remainder of the day or shift on which the accident occurred. As compared with 1923, the number of employees in 1924 was 14 per cent. less; the average workdays per man, 6 per cent. less; and the number of deaths 21 less and of nonfatal injuries 948 less than in 1923.

Pennsylvania employed more men at coke ovens during 1924 than any other state, 6,819; Ohio ranked second, with 2,099; other states employing more than 1,000 were Indiana, Alabama, Illinois, and Michigan.

Loss of time from all fatal and nonfatal accidents at coke ovens in 1924 is estimated at about 3 per cent. of the total number of man shifts worked during the year.

Since 1915 the Bureau has classified injuries as: (1) fatal; (2) permanent total disability; (3) permanent partial disability; (4) temporary disability: (*a*) lasting more than fourteen days, (*b*) lasting more than the remainder of the shift but not exceeding fourteen days. During the eight years 1917 to 1924, 30,118 accidents at coke ovens have been reported to the Bureau, as follows: fatal, 1.22 per cent.; permanent total disability, 0.05 per cent.; permanent partial disability, 1.69 per cent.; and temporary disability lasting more than fourteen days, 16.52 per cent., lasting from one to fourteen days, inclusive, 80.52 per cent. More than 62,000,000 shifts were worked by all coke oven employees during this period; the average accident rate was 1.77 killed and 143.68 injured per thousand 300-day workers.

The main causes of nonfatal injuries at coke ovens during 1924 were: falls of persons; burns, falling objects; cars, lorries, and motors; and hand tools, in the order given. Haulage equipment, coke drawing machines, and falling objects caused the highest fatality rates. Tables are given showing comparative data for fatalities and injuries at beehive and at by-product ovens, by causes and by states; for all coke ovens by states; for widows and orphans caused by fatal accidents by states; etc.

A comparison of accident hazards at large coking plants with those at smaller ones in 1924 shows that the injury rates for beehive ovens were highest at plants employing 100 or more men each, although the lowest rate for small plants employing one to twenty-four men was due probably as much to incomplete records of minor injuries as to simpler and therefore less hazardous working conditions. For by-product ovens the highest rates were for groups employing one to forty-nine men, and the lowest injury rates were for plants employing 300 or more men each.

Comparative frequency and severity

accident rates are given in a table for various industries (mineral, woodworking, petroleum refining, manufacture of paper and pulp, etc.). By far the highest rates occur in metal mines (underground and shaft only given), those for coke ovens (by-product and beehive) coming well under the highest.—B. A.

MISUSE OF FLAME SAFETY LAMPS AND DANGERS OF MIXED LIGHTS. *L. C. Ilsley. U. S. Bur. Mines, Miners' Circ. 29, 1925, pp. 12.*

Tests made at the Pittsburgh Experiment Station of the United States Bureau of Mines have shown the following with regard to the best type of safety lamp: "A single-gauze lamp without a bonnet is safe only in slow-moving air currents; a small-size lamp is not as safe as one of standard size; and a lamp without a bonnet is not as safe as one with a bonnet. The bureau believes that lamps with internal relighters and magnetic locks are the safest; in fact, it has not approved and probably will not approve a key-locked lamp."

Instances are given of accidents that have happened because the flame safety lamps have been misused or used when not in good condition, or have been used in the same mine at the same time with open lights. Safety suggestions are made, and precautions given for the fire boss, for the foreman, and for the mine operator.

Finally, it is urged that all coal mining states "have adequate laws covering the use of flame safety lamps. Each State inspector should satisfy himself as to the safety of the lamps being used. The States should require the best known safety practices for handling flame safety lamps, and should strictly enforce these regulations."—B. A.

INDUSTRIAL SURGERY

THE TREATMENT OF INDUSTRIAL SURGICAL ACCIDENTS. *F. P. Fouche. Med. Jour. So. Africa, April, 1926, pp. 234–246.*

The author presents a useful essay of some length to illustrate that restoration of function should be the aim of every surgeon. Pott's fracture is used as an example of immediate treatment, period of rest, and functional restoration. Stereoscopic radiography is necessary to insure anatomic alignment. Free joint movement must be present. Pressure on ligaments from effusion must be relieved. Fracture of peripheral nerves must be looked for and remedied. Muscles must be developed and reeducated. Prolonged and unnecessary rest lowers a patient's morale. The whole case should be carried through by one team of workers. Consideration is given to the use of electricity, hydrotherapy, and massage, particularly for compound fractures and suppurating wounds. Occupational therapy is also recommended. The establishment of special departments for industrial accidents with their own staff and technical equipment is strongly advocated.—E. L. C.

INDUSTRIAL PHYSIOLOGY: NUTRITION, METABOLISM, FATIGUE, ETC.

ON INDUSTRIAL FATIGUE AND ITS EFFECTS ON HUMAN ACTIVITY IN INDUSTRY. *D. R. Wilson. Jour. State Med., June, 1926, vol. 34, pp. 343–349.*

A short summary is given of some of the activities of the Industrial Fatigue Research Board by its secretary, Mr. D. R. Wilson. He shows, by example, how output is affected by human influences; thus in weaving where humidity and warmth benefit the process, but are disadvantageous physiologically, output begins to fall at a wet bulb temperature of 73° to 75°F., which is below the optimum for thread breakages, but above that for human activity; in illumination, artificial light always lowers output as compared with daylight; and with regard to temperature, warm air may lower output as much as 30 per cent. as compared with cool air. Rest pauses, again, judiciously interpolated, improve production. At every step economic advantage is found to result from attention paid to the workers' physiology and psychology; and industrial prosperity to be interlocked with human efficiency.—E. L. C.

HEAT, COLD, AND HUMIDITY

EFFECTIVE TEMPERATURE FOR PERSONS LIGHTLY CLOTHED AND WORKING IN STILL AIR. *F. C. Houghten, W. W. Teague, and W. E. Miller. Jour. Am. Soc. Heating and Ventil. Eng., June, 1926, vol. 32, pp. 473–478.*

This report deals with the development of a third scale of effective temperature, that for men at work and lightly clothed. The other two scales appeared previously in publications of the Society which have been abstracted in THIS JOURNAL (1923–1924, vol. 5, p. 69; 1924, vol. 6, p. 100; 1925, vol. 7, p. 144). This new scale shows the relation between the temperature and humidity of the air and the warmth of the body when the latter is lightly clothed and performing muscular work at the rate of 90,000 feet per hour. It is applicable to industries, especially to the mining industry. The effect of air movement is yet to be determined.

Taking the effective temperature scale for men at rest and stripped to the waist as the base line, it appears that men at work are slightly more sensitive to temperature and less sensitive to humidity than are men at rest. This is contrary to what might be expected. In the opinion of the reviewer, it is possible that this slight difference is due to the additional work shirt worn in the work experiments. Ordinary clothing renders one much more sensitive to temperature than to humidity. For instance, while in ordinary room temperatures, dry and wet bulb temperature are of equal thermal importance to men at rest and stripped to the waist, 1° of dry bulb is equivalent to 2° of wet bulb for men normally clothed. For men at work and lightly clothed, 1° dry bulb is equivalent to $\frac{6}{5}$° wet bulb. The difference of $\frac{1}{5}$° may easily be attributed to the additional shirt

worn in the work experiments.—C. P. Y.

OBSERVATIONS ON THE RESPONSE OF HUMAN BEINGS TO ESTABLISHED KATA-THERMOMETER STANDARDS, WITH SPECIAL REFERENCE TO THEIR ABILITY TO DO WORK UNDER DIFFERENT THERMIC CONDITIONS. PART I. THE SKIN TEMPERATURE AND FEELINGS OF THE SUBJECTS AT DIFFERENT KATA-THERMOMETER VALUES. *B. Heymann and A. Korff-Petersen. Abstr. from Ztschr. f. Hyg., 1925, vol. 105, pp. 450–482, in München. med. Wchnschr., Jan. 22, 1926, vol. 73, p. 167; and in Zentralbl. f. d. ges. Hyg., April 10, 1926, vol. 12, p. 380.*

These German observations present further evidence on the limitations of the kata-thermometer as an index of the warmth of the body. They show that, in still air and with average humidity, the forehead surface temperatures of different individuals are about the same and follow the indications of the dry kata-thermometer fairly closely. In moving air, however, the forehead temperatures of different persons vary considerably and bear no definite relation to the dry kata. Within the limits of the experiments, the wet kata indications show scarcely any relation to forehead temperature.

In the opinion of the authors, there is no reliable data on the cooling power of the kata in different combinations of temperature, humidity, and air movement. (In the United States the kata-thermometer is not, as a rule, used as an index of the warmth of the body, but only as an anemometer for low air velocities. The effective temperature index developed by the Research Laboratory of the American Society of Heating and Ventilating Engineers has replaced the kata-thermometer for such use.)—C. P. Y.

INDUSTRIAL SANITATION: FACTORY CONSTRUCTION, ILLUMINATION, VENTILATION, HEATING, WATER SUPPLY, SEWAGE DISPOSAL

MEASURING THE SMOKE POLLUTION OF CITY AIR. *J. S. Owens. Analyst, Jan., 1926, vol. 51, pp. 2–18.*

"The methods hitherto adopted have been very numerous, but we may divide them into two groups:—(1) Those aiming at measuring the deposit of impurity from the air; (2) Those which deal with the impurity while suspended in the air." The author then reviews the most important methods which may be employed in making these measurements. Following this brief review he describes the three methods in use today by the Advisory Committee (British) on Atmospheric Pollution: (1) the deposit gage, (2) the automatic filter or recorder, (3) the dust counter (Owens').

Although there is nothing in this paper that Dr. Owens and his associates have not already described in the annual reports of the Advisory Committee, it should be of especial interest to American readers as a plain statement of routine analyses and measurements which are being made daily in the British Isles—measurements which we need today even more than the British.—P. D.

FAN VENTILATION IN A HUMID WEAVING SHED. AN EXPERIMENT MADE FOR THE DEPARTMENTAL COMMITTEE ON HUMIDITY IN COTTON WEAVING. *S. Wyatt, J. A. Fraser, and F. G. L. Stock. Indust. Fatigue Res. Board, Rep. No. 37, pp. 31. H. M. Stationery Office, 1926.*

Electrically driven gyrating fans were installed in a weaving shed. The effect upon cooling power of the air was measured; at the same time thread breakages and output of cloth were noted. Details are given of air velocity, temperature, and relative humidity prevailing at the time of the observations. The results indicated that the air movement created by the fans aided weaving efficiency; the workers were as efficient at high temperature and humidity with air movement as they were at lower temperature and humidity without it. The air movement had no significant effect on warp breakages. The highest output was obtained at temperatures from 72.5°F. to 75°F. with a relative humidity of 75 to 80 per cent. The fans used increased air movement from 46 to 147 feet per minute. Without fans the minimum standard cooling power for sedentary work was not obtained. With fans this standard was obtained at temperatures below 77.5°F.

This investigation is only intended to demonstrate to the cotton industry the value of fans, so that engineers can proceed further with the idea. Thus, under certain circumstances larger fans than the small ones used might be found more suitable. The suggestions put forward are a practical effort to solve an old problem of bodily discomfort under atmospheric conditions especially suitable for weaving. The report contains illustrations and diagrams.—E. L. C.

INDUSTRIAL HEALTH LEGISLATION: COURT DECISIONS: WORKMEN'S COMPENSATION AND INSURANCE

NEW BRITISH CONSOLIDATING FACTORY BILL.

The introduction of the new Factories Bill before Parliament marks a stage in the progress of industrial medicine. It belongs to that group of legislation which, without going ahead of good practice, embodies in enactments what has been gained. It is essentially a consolidating measure and brings together into one code what is at present scattered over thirteen Acts and many Orders and Regulations, all of which have been placed on the statute book since 1901, the date of the last consolidating Act. But it also contains new matter and wipes out several out-of-date anomalies; it proposes a forty-eight-hour week for protected persons; it abolishes the distinction between factories and workshops, and a factory becomes a place where anyone is employed in manual labor for purposes of gain in making, altering, repairing, demolishing, or adapting for sale any article. Similarly any distinction between textile and nontextile factories disappears. The expression "factory" is further defined to include certain specific industries, such as the generation of electricity, dry docks, laundries, locomotive works, and letterpress printing. Certain provisions are made to

apply to work on ships in harbor or wet dock, and others to building operations; both of these extensions are of considerable importance.

Certain things, previously called for under Welfare Orders, are now in the body of the Bill, such as supplying drinking water, seats for female workers, first aid and ambulance equipment; while the power to make Welfare Orders is continued and elaborated. Enforcement of a reasonable standard of sanitary conditions which, so far as workshops are concerned, has been administered by local sanitary authorities, is now logically transferred to the factory inspectors; but controversy may arise here before the Bill is passed. Interest must also attach to abolition of the post of certifying surgeon, the duties of which—now considerably strengthened—are vested in "appointed doctors" who are to be medical practitioners acting for individual factories or groups of factories. As this scheme should permit firms to have a say in choosing their doctor, it should be of great value in opening the door to the development of a factory medical service on a surer foundation than has existed hitherto. Power is also taken to transfer the duties to county councils, but doubt may be expressed as to whether it will be used, or, if used, found successful.

Only those familiar with present factory legislation will appreciate to the full how the Bill proposes to extend and strengthen present enactments as called for in the light of experience, and to simplify administration. There are many points on which difference of opinion will arise when the Bill comes up for discussion; but there can be little doubt that, when finally passed, it will be a powerful instrument for raising the general standard of industrial conditions, and so make for better managed and more efficient factories.—E. L. C.

INDUSTRIAL MORTALITY AND MORBIDITY STATISTICS

An Attempt to Provide a Standard Death-Rate for British Merchant Seamen. *W. E. Home. Lancet, April 17, 1926, vol. 1, pp. 828–830; April 24, 1926, pp. 877–879.*

Merchant Seamen. *Lancet, April 24, 1926, p. 871.*

An effort is made in these two articles, to which attention is directed in an editorial note, to present the mortality occurring among the mercantile marine. But apart from the fact that however the subject is approached the death rate is unusually high, no satisfactory estimate can be arrived at. One estimate is published by the Registrar-General based on (*a*) the census of seamen, and (*b*) deaths which occurred among that population, *but* the Registrar-General has no knowledge of, and therefore does not include, deaths among seamen occurring abroad. Another estimate is made by the Board of Trade which, however, is concerned only with deaths of seamen while on ships' articles or in a foreign port; thus a seaman's death from accident or from phthisis in hospital at Port Said would be included, while a death from accident or phthisis after discharge at home would not; but it would be included

by the Registrar-General. As a result of such incomplete information, there are presented such anomalies as:

Causes of Death of British Merchant Seamen about 1901

	Registrar-General		*Board of Trade*	
	No.	%	No.	%
Diseases....	1,678	80.5	555	34
Alcohol.....	27	1.3	120	7
Accidents...	379	18.2	978	59

Even the populations at risk differ in total and in age distribution, thus the Registrar-General's population of seamen in 1901 was 97,065, while that of the Board of Trade was 117,558. At that time the death rate according to the Board of Trade was 13.7, but according to the Registrar-General it was 21.5.

During the last twenty-five years the lot of the seaman has improved; the passing of the sailing vessel has greatly lessened his accident risks, and the change from coal to fuel, now in progress, is lightening the physical labor and exposure to heat of the stokehole. Something has also been done to improve food, cooking, and accommodation. Dr. Home, after criticizing, next essays a rough estimate of his own of the mortality for seamen in 1921 and arrives at a figure of 11.7 per thousand in contrast with 6.4 for a similar population ashore, and with 4.3 for the Army, 3.6 for the Navy, and 4.7 for the Air Force. The data on which he works are given in detail, and certainly justify the claim that the vocation of merchant seaman is far from healthy.—E. L. C.

SUBJECT INDEX TO VOLUME VIII

This is a subject index to all the reading matter in the ABSTRACT OF THE LITERATURE OF INDUSTRIAL HYGIENE, and one should, therefore, look for the subject word. The name of the author follows the subject entry in parentheses.

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